

COMPUTING FOR HOME AND BUSINESS

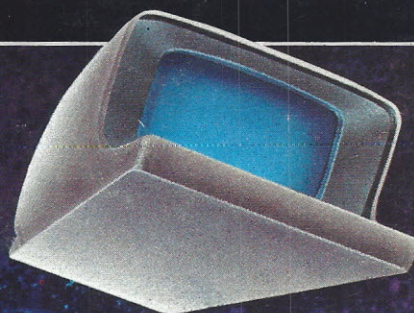
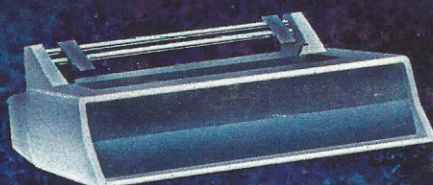
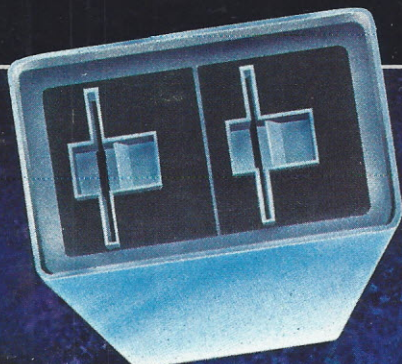
INTERFACE

AGE™

NOVEMBER 1980

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also for multiple users, but implemented in COBOL, familiar to commercial users the world over.

And applications programs for these operating systems number in the thousands. From real estate to accounting, taxes to inventory control, they're all available at low cost—ready to run.

When you add these software and hardware features to Industrial Micro Systems' reputation for rugged, reliable quality products you'll begin to see it all. A lot more systems than your first glance reveals.

See even more at your dealer. Call us to find out the name of your nearest dealer. He'll tell you everything you need to know. And really open your eyes!

*Trademark of Digital Research Inc.

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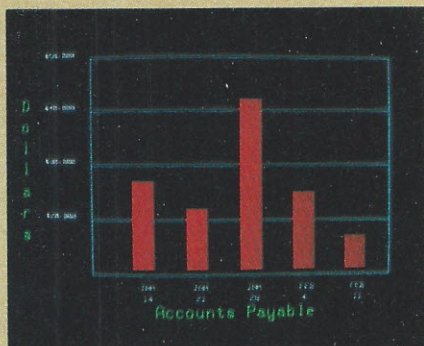
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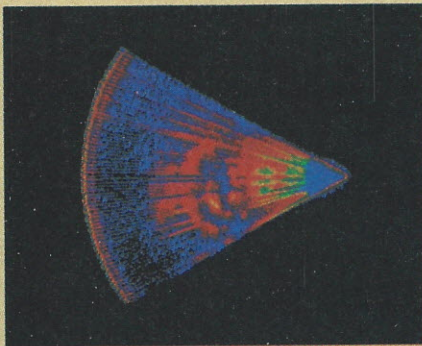
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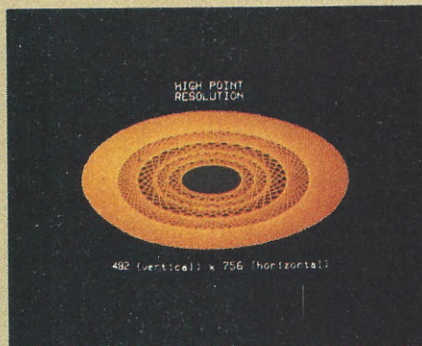
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Management Information Display



Ultrasonic heart sector scan



High-resolution display with alphanumerics

Get the professional color display that has BASIC/FORTRAN simplicity

LOW-PRICED, TOO

Here's a color display that has everything: professional-level resolution, enormous color range, easy software, NTSC conformance, and low price.

Basically, this new Cromemco Model SDI* is a two-board interface that plugs into any Cromemco computer.

The SDI then maps computer display memory content onto a convenient color monitor to give high-quality, high-resolution displays (756 H x 482 V pixels).

When we say the SDI results in a high-quality professional display, we mean **you can't get higher resolution than this system offers in an NTSC-conforming display.**

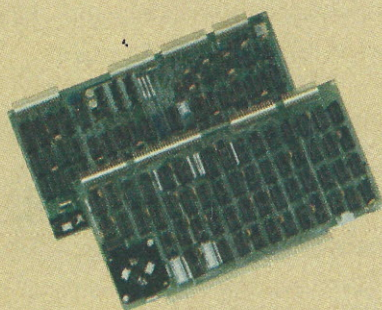
The resolution surpasses that of a color TV picture.

BASIC/FORTRAN programming

Besides its high resolution and low price, the new SDI lets you control with optional Cromemco software packages that use simple BASIC- and FORTRAN-like commands.

Pick any of 16 colors (from a 4096-color palette) with instructions like DEFCLR (c, R, G, B). Or obtain a circle of specified size, location, and color with XCIRC (x, y, r, c).

*U.S. Pat. No. 4121283



Model SDI High-Resolution Color Graphics Interface

HIGH RESOLUTION

The SDI's high resolution gives a professional-quality display that strictly meets NTSC requirements. You get 756 pixels on every visible line of the NTSC standard display of 482 image lines. Vertical line spacing is 1 pixel.

To achieve the high-quality display, a separate output signal is produced for each of the three component colors (red, green, blue). This yields a sharper image than is possible using an NTSC-composite video signal and color TV set. Full image quality is readily realized with our high-quality RGB Monitor or any conventional red/green/blue monitor common in TV work.



Model SDI plugs into Z-2H 11-megabyte hard disk computer or any Cromemco computer

DISPLAY MEMORY

Along with the SDI we also offer an optional fast and novel **two-port** memory that gives independent high-speed access to the computer memory. The two-port memory stores one full display, permitting fast computer operation even during display.

CONTACT YOUR REP NOW

The Model SDI has been used in scientific work, engineering, business, TV, color graphics, and other areas. It's a good example of how Cromemco keeps computers in the field up to date, since it turns any Cromemco computer into an up-to-date color display computer.

The SDI has still more features that you should be informed about. So contact your Cromemco representative now and see all that the SDI will do for you.



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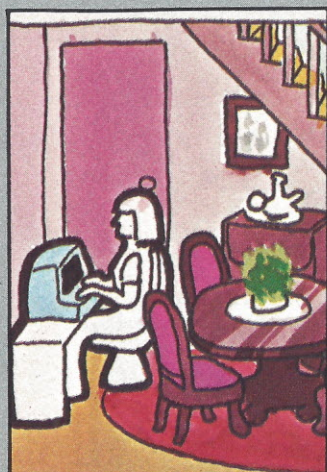
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INTERFACE AGE™

COMPUTING FOR HOME AND BUSINESS APPLICATIONS



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Cover illustration by
Fino Ortiz

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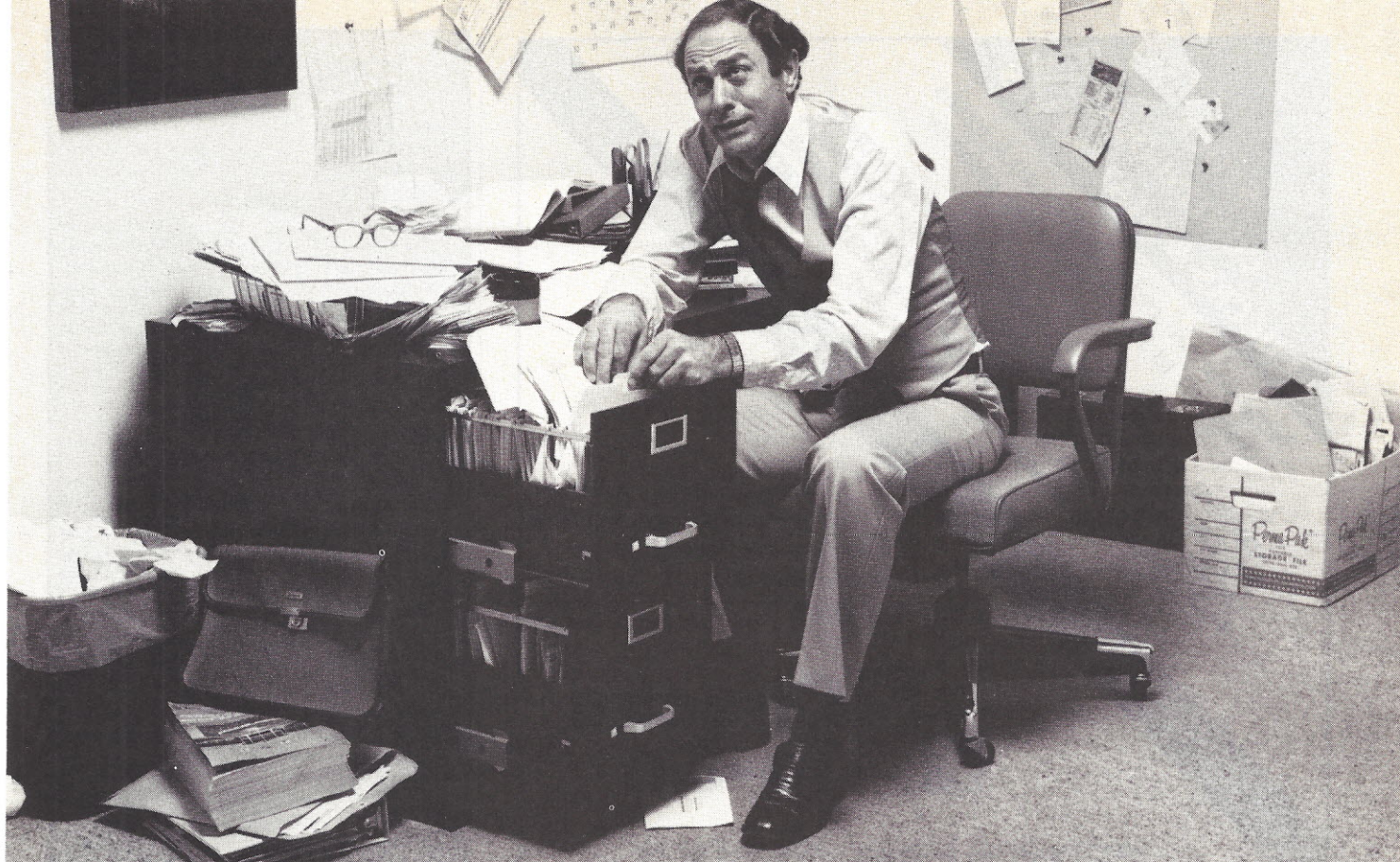
Contact authors of monthly columns by writing to them at INTERFACE AGE, P.O. Box 1234, Cerritos, CA 90701 in care of their respective columns.

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Record keeping problems? Our CCA Data Management System solves them easily.

Having information at your fingertips can make your job a whole lot easier. And that's what the CCA Data Management System is all about.

With this Personal Software™ package and an Apple II™ or TRS-80™ disk system, it will be far easier to keep inventories, customer lists, accounts receivable and payable records, patient histories and many more items.

In fact, you can use the CCA DMS for all of your data management needs, rather than buying (expensive) or writing (time consuming) separate programs for each application. That's because DMS lets you create your own filing systems, adapting itself to the types of records you keep. You specify the number and names of each data field—without any programming.

With DMS keeping all of your records, you only have to learn how to use one system. That's easier, too. It's menu driven, with plenty of prompts to help you create files and add, update, scan, inspect, delete, sort, condense and print data. Our comprehensive 130-page step-by-step instruction manual even provides complete "how to" inventory and mailing list applications so you can start processing immediately.

DMS is a very powerful system, with more file and record storage capacity than other data base programs on the market.

And it also gives you greater data handling flexibility. To customize DMS, write add-on BASIC programs that read or write DMS files and perform any kind of processing you want.

You can sort and print your data in nearly any form of report and mailing label you want. Sort data by up to 10 fields for zip code, balance due, geographic location or whatever. And print reports with subtotals and totals automatically calculated.

Apple DMS has two additional features. Its ISAM search method helps you find any item on a diskette within 10 seconds. And its Data Interchange Format Program allows you to move DMS files into our Apple VisiCalc™ program—the "electronic worksheet"—for powerful, flexible calculating.

Ask your Personal Software dealer to show you how easy computerized record keeping is. To locate the nearest dealer, contact Personal Software Inc., 408/745-7841, 1330 Bordeaux Drive, Sunnyvale, CA 94086.

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**PERSONAL
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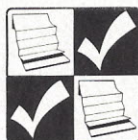
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CIRCLE INQUIRY NO. 4



EDITOR'S NOTEBOOK

CES picked "the" sales show

While there are any number of good computer shows, and a surprising number of bad computer shows, the fact of the matter is that there is no good national computer show that really addresses the needs of our industry.

There are two different approaches that vendors can take when attending a show. The first is to go to a regional consumer show, grab as many end-user sales as possible (assuming that selling is allowed) and hope to hit a few dealers to make the show worthwhile. Shows of this type include the West Coast Computer Faire, John Dilk's annual Philadelphia show and others.

Another approach is to go to one of the large national shows, such as NCC, INFO and Datacomm. Many of these are beginning to include micros, some integrating them into the entire scheme of things and others relegating them to "sideshow" status, worthy only of passing interest.

Good arguments could be put forth for both types of shows, and I certainly wouldn't recommend abandoning existing show plans, especially if they have proven successful. Yet we are a consumer-oriented industry; certainly not completely so, but much more so than IBM, Burroughs or NCR. If you count the Radio Shacks, Heath stores and retail computer outlets, we probably have close to 10,000 retail outlets where consumers can buy computers. Add to that the number of large chain stores that are going to carry computers next to the cameras, binoculars and calculators—and there can be no doubt that a very large segment of our industry is consumer oriented.

There is a show, quite successful in its own right, that seems to make a lot more sense for our industry than an NCC or INFO. It's the Consumer Electronics Show, and I predict that we will see more and more computer companies exhibiting in it every year; I further predict that it will become the largest source for new product introductions than any other show.

It's simple: unless a vendor is dedicated to selling products one at a time to individual users, he needs a product forum where potential dealers can see products exhibited in a professional atmosphere. The mob scene at NCC, and the end-user orientation of local shows, do not create this atmosphere.

There are two CES shows annually: the summer in Chicago and the winter in Las Vegas. It is a limited-admission show and, by restricting it from individual users, it creates a business-like

atmosphere that lends to the professionalism of the industry.

The show's practice of color-coding name badges with such categories as chain-store buyer, manufacturer's representative, exhibitor and the like, helps vendors pre-qualify the already preferred audience.

While the show is not a selling show in the sense that vendors bring large inventories, there seems to be no restriction on making business deals and signing contracts.

The reality of business is that most vendors would rather talk to the electronics buyer of a chain or large store, than with a 16-year-old budding genius interested in esoteric applications.

If a vendor has been trying unsuccessfully to get into NCC, but can't seem to crack the waiting list, CES is a must.

Mini-makers hit mass market

It appears that another minicomputer maker has joined DEC in deciding that retail computer sales can be successful. Data General Corp. has announced a program for marketing small business systems through independent retail outlets. While DEC has taken to opening its own computer stores, DG has signed agreements with five distributors, allowing them to sell the Nova and Micronova computers to more than 50 retail computer stores nationwide.

With the great success of the microcomputer store, and the entry of DEC and DG into mass marketing, you can expect other mini-makers to follow suit.

Useful resource

A handy document crossed my desk the other day, the Software Vendor Directory by Microserve, Inc. This loosely-bound publication lists more than 700 software vendors within 34 categories of hardware. Running some 200 pages, it divides software into several categories, including personal, programming, general business, and industry packages.

Available for \$37.95 from the vendor at 250 Cedar Hill Ave., Nyack, NY 10960, this directory should prove very useful to stores, dealers and retail outlets, and should be of peripheral interest to software authors looking for firms to market their work.

Free journal

A recent issue of the Journal of Applied Management featured an instructive article by Chuck Bradley on selecting small business software and another on computer tampering by Belden Menkus. The publisher of this journal is

offering a free copy of that issue to IA readers. To get a copy, write to Journal of Applied Management, EDP issue, Box 4989, Walnut Creek, CA 94596. Be sure and include a loose 15¢ stamp.

Software exchange

A free software exchange service is now available to PDP-11 users. The service works on a system of credits, whereby those users who submit software are given credits that enable them to obtain other software which is listed in a monthly software exchange bulletin.

The idea of credits is interesting, and could help with the age-old problem of "takers." Takers are people who enroll in software exchanges and always take, but rarely contribute.

The exchange can be contacted by writing to PDP-11 Software Exchange, 1101 Noble Forest Dr., Norcross, GA 30092. That address, incidentally, happens to be that of General Systems, Inc., but that firm's relationship with the exchange is not apparent.

New for Heath

Of particular interest to Heath owners will be a new bi-monthly floppy disk based publication called Micro Media.

MM will reportedly provide software, reviews, graphic art, ads, articles and untold other features for the Heath H-8, H-88, H-89 and Zenith Z-89 computers.

The price is steep—\$55 for a year's subscription, but single copies are available for \$11.95 and the first issue covers the June-July timeframe and should be available now. The floppy disk magazine is reportedly available in both Benton Harbor Basic and Micro-soft, as well as in either HDOS or CP/M.

Of interest to dealers. . .

The National Association of Computer Stores has been formed, claiming to be a national trade association representing retail computer stores. Intracom, Inc., a Ft. Pierce Fla.-based management firm, is reportedly in on the development of the association and the firm's president is serving as association president as well.

The announced purpose includes: helping retail computer stores prosper and expand; cooperate with applicable government agencies and legislative bodies; and represent the economic and educational interests of computer retailers.

Anyone wishing further information is invited to contact: The National Association of Computer Stores located at 3255 South U.S. 1, Fort Pierce, FL 33450. No further information on the cost or duration of membership was available from the association.

Now! North Star Application Software!

North Star now offers application software for use on the HORIZON! Now you have one reliable source for both hardware and software needs! The first packages available are:

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NorthWord is a simple-to-operate word processing system designed for use with the popular North Star HORIZON. NorthWord enables you to increase office efficiency and cut document typing time and cost. NorthWord incorporates the most sought-after word processing features: easy editing, on-screen text formatting, simultaneous document printing, and much more. NorthWord can be integrated with other North Star software packages to produce customized letters, labels and reports quickly and efficiently.

MailManager—

MailManager enables you to compile and maintain complete organized mailing lists. Lists are easily accessible and can be compiled with a great deal of flexibility. Entries, corrections and deletions are easily made. The North Star MailManager can print your list on individual envelopes, on mailing labels, or in compact summary form.

InfoManager—

InfoManager is a powerful list-oriented, data management system. It will accept up to 50 categories of information for each record and has the ability to select and sort before printing. The North Star InfoManager has power and flexibility for many applications: product inquiry, inventory, customer/client records, calendar reminders, and as an easy way to fill in often-used forms.

GeneralLedger—

General Ledger and Financial Reporting, two programs in one, maintains general ledger accounts based on such input as checks, bank deposits and journal entries, and uses the information in the general ledger to produce customized financial statements and financial reports.

NorthWord is the central building block for all the North Star application software to follow. Packages now being tested include other accounting and professional application packages. For more information or a demonstration, contact your local North Star dealer.

CIRCLE INQUIRY NO. 44

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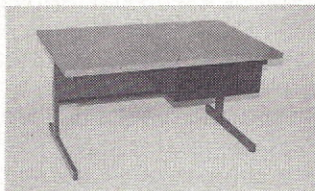
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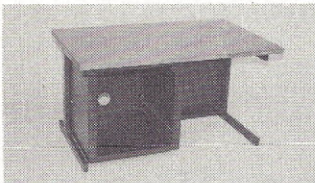
A compact bi-level desk ideal for an Apple computer system. This 42" x 31 1/2" desk comes with a shelf to hold two Apple disk drives. The top shelf for your TV or monitor and manuals can also have an optional paper slot to accommodate a printer.

Choose a Micro Desk



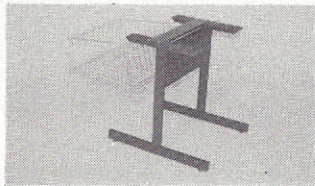
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LETTERS

Mailings sought down-under

I would like manufacturers to send me some copies of pamphlets on the types of computers they sell to the public in America. I am trying to find out as much as possible about microcomputers.

Geoff Banks
40 Essex Road
Mount Waverley 3149
Victoria, Australia

Micro love story

Thank you for that Update item in your August '80 issue. I bought an Interact over a year ago by mail order and thought that I had been abandoned.

Not so. I'm pleased to have found an active user community and a source for new tapes. With Interact, it was always "promises, promises." Today I can get more software and accessories for my machine, including an RS232, than I ever could when the manufacturer was in business.

I love my Interact!

Doug Ross
Pittsburgh, PA

Re-sorting arrays

In chapter 5 of the series Using and Building Micro-Based Systems, there were two examples of sorting arrays in Fortran. I believe that these listings (which were transposed) are misleading.

For the insertion sort, reference is made to Knuth's book on sorting and searching, but the algorithm is not quite the one suggested by Knuth, which is shorter and simpler and will normally execute faster.

The other sort algorithm shown is an exchange sort, but it is not the one which is commonly known as the bubble sort. Knuth, Lorin and a number of authors agree that the bubble sort is an exchange sort which always compares adjacent elements in the array and makes a variable number of passes through the array until no exchange has been made. One point in the algorithm shown results in an unnecessary increase in sorting time. The 'do' statements in lines 5300 and 5400 result in each element in the array being compared to itself. This is unnecessary and can be avoided by modification of the 'do' statements.

Arne Rohde
Struer, Denmark

Let that "handshake" through

John R. Dye (Letters Jul 80) should not give in to his impulse to trade in his Heath H14 printer just because at present it will not run above 110 baud on his North Star Horizon. The standard Horizon is set up to ignore the RS232 handshake signal on pin 20 (DTR), but that is presumably to protect any first-time users who might connect up via a 3-wire cable and would otherwise find that the Horizon quite properly stopped dead, waiting for a handshake that never came.

The handshake mechanism is there all right, but the line is held high on both the left and right serial channels by the motherboard pull-up resistors R11 and R19 respectively. The simplest solution to Mr. Dye's problem is to bend out pin 5 of the 1489 receiver at 4C, which will reenact the proper response to DTR on the right serial channel and let him run his printer at any baud rate that it supports. However, he must use a cable connection that includes line 20, and the printer must be online and suitably initialized or the system will stop and wait at the first output to channel #1.

Bending out pin 5 of the other 1489 at 3C will do the same for the left serial channel if required. This will let you unplug the console in the middle of output, for example, and have it pick up again, when reconnected, at exactly where it left off. But the warning given previously will now apply with whistles and bells, because the Horizon will appear to be dead to all console traffic if anything prevents the handshake from getting through.

The most fail-safe solution might be to add a timer circuit so that the Horizon waited a reasonable time for the handshake, then gave up and continued with the next instruction.

Robin Shirley
Surrey, England

Remote control addition

I read the article in the July issue of IA concerning the remote control use of microcomputers.

In your article you missed the Connecticut Micro Computer Super X-10 Mod for the Pet, Apple, TRS-80, Kim and S-100 bus computers. This unit replaces the BSR-X-10 control box, but uses all three of the remote receivers. The unit plugs directly into the expansion port of a TRS-80, and since there are no hardware connections to the remote units, it would be very attractive to apartment dwellers.

Rick Smith
Longmont, CO

The Talk of the '80s.



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CIRCLE INQUIRY NO. 15

10 INTERFACE AGE

LETTERS

Author makes it right

In my article Beating the System (Sep 80), I would like to point out a small error which I just discovered. I pointed out (correctly) that a procedure in Apple Pascal is limited to a length of 1,200 bytes. However, I have since discovered that if a procedure is in itself composed of nested procedures, only the procedures at the lowest level of nesting are limited to 1,200 bytes. The outer level procedure may, in fact, contain several procedures that are each nearly 1,200 bytes long. Thus, I could have made my programs into several segment procedures, each of which would have been composed of many nested procedures (as were the original programs). I have used this technique to prepare a sub-menu for my customer which allows him to select from six different utility programs. I do, however still use the modified operating system to provide the starting menu selection.

Mark J. Borgerson
Corvallis, OR

Is touch-telephone interface on line?

I have been unable to locate a manufacturer of a device to attach any readily available personal computer to the telephone system in order to interface a touch-tone telephone to the computer. The desired device should be able to: answer calls, receive a variable amount of touch-tone data, provide some type of yay/nay acknowledgement to the caller, initiate calls using touch tones, and initiate other ESS custom calling services.

I would appreciate any information your readers could offer.

Steven Schochet
P.O. Box 14073
San Francisco, CA 94114

Simple problem, simple solution

My dealer has recently solved a problem with my Apple II Plus which had been driving me crazy. Hopefully, someone else can now benefit from the solution.

The problem was that when editing, as the cursor passed over certain characters, it would produce gibberish and subsequently the edited line would be rejected (syntax error). What my dealer finally discovered was that the problem only occurred when the machine had been in the "flash" mode and the reset key was pressed to edit. The solution, of course, was simple: type in "normal" before editing.

Gary Markman
Yonkers, NY

NOVEMBER 1980

You'll be a little richer after building one of these.

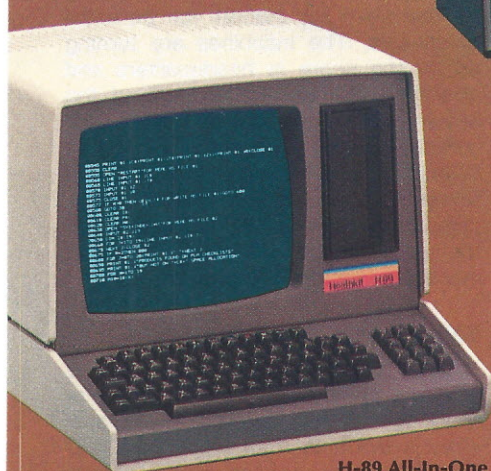
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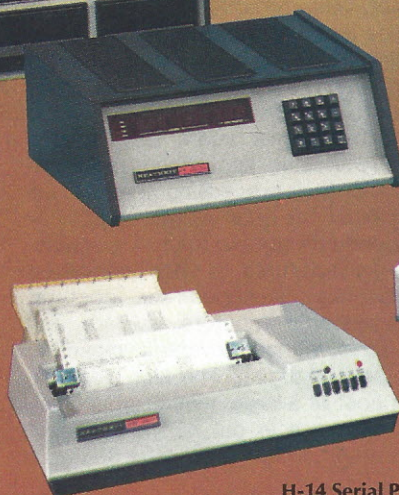
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CIRCLE INQUIRY NO. 26

CP-186

World telecommunications market to more than double by 1990

With Asia setting the pace, the world's telecommunications market will grow from an estimated \$40 billion in 1980 to about \$87.5 billion by the end of this decade, according to a report issued by Arthur D. Little Inc.

The consulting firm predicts that the Asian region will grow to \$27 billion in 1990, a rate growth well above the world's average, led chiefly by heavy capital investments by five countries—USSR, Japan, Korea, China and Turkey.

The report is the first English language in-depth survey of the Russian market, which reveals that the USSR currently accounts for one-third of the Asian telecommunications equipment market. The \$3.5-billion, however, is clouded by the fact that much equipment is obtained through barter with Eastern European countries.

Behind U.S. developments in television via satellite, the USSR is installing hundreds of receive-only earth stations. These are primarily to service remote communities. In another comparison, there are only about 20 million telephones in the USSR for an estimated population of 268 million versus 175 million in the US for a population of 224 million.

With about 30% of the telecommunications equipment market by 1990, Asia will surpass Europe and be second only to North America in size. In some cases, the country representing the largest market will be displaced by another in 1990. For example, Russia will replace Japan as the largest market in Asia.

Spotty future predicted for retail computer stores

Despite the belief of many small business computer manufacturers that retail stores represent profitable sales outlets, a recent survey of buyers indicates this is not the case. According to Venture Development Corp., Wellesley, MA, only 7.3% of business micro users obtained their system from a retail store. Even more significant: of potential users, only 5.7% indicated that they would go to a computer retail store to purchase one. The consulting firm's conclusion—the trend toward independent or manufacturer-owned retail stores will not play a significant role in accelerating sales to small businesses.

When compared with present users, potential buyers from a cross-section of small businesses indicated that they would turn more to dealers/distributors

and system houses. While more than two-thirds of present users acquired their system directly from the manufacturer, only half said they would go this route. Of potential users, 16.6% said they would go to dealers/distributors and 12.6% to systems houses, compared with 13.5% and 6.8% respectively of present users.

Retail computer outlets will be more effective in selling to computer "sophisticates"—hobbyists, computer professionals, and large companies who already use computer equipment. The small businessman, with little or no computer experience, will be a less likely customer for retail stores because he needs a full range of support and maintenance services, which retail computer stores are generally unable to provide. In fact, user selection criteria ranked service and maintenance at the top of the list. Price was ranked fifth, precluding retail stores' attempts to use lower prices to attract small business owners.

Small business users also require industry-specific applications software as part of their processing needs. It will be difficult for retail stores, especially independents but even some manufacturer-owned stores, to offer specialized applications packages for doctors, wholesalers, distributors, lawyers, and CPA firms, without adversely impacting their profit margins. The high development cost of a large number of specialized packages is out of the range of most retail stores.

Home time-sharing to reach 100,000 subscribers by 1981

Consumers are reportedly flocking to sign up for time-sharing services, with as many as 100,000 persons hooked in by the end of 1981. There are currently two consumer time-sharing services, with a total of about 8,000 users, according to a report by International Resource Development Inc., which predicts entry into the market by several major companies during the next three years. Total revenues generated from these services could exceed \$1 billion per year before the end of the current decade, and most will be derived from computer and communications facilities which otherwise would be idle during evenings and weekends.

Demand for the services have become so strong that both The Source and Compuserve are adding more computers to handle an expected ten-fold increase in the number of users in the next year or so. The Source has reached agreement to use Tymshare's computers in off-hours. Compuserve has

several more computers that could be made available as business expands.

Tymshare has positioned itself so as to obtain an inside view of the development of consumer time-sharing over the next three years, without needing to make a major commitment in new computers and facilities.

It is predicted that several years will elapse before time-sharing services broaden beyond current use by computer hobbyists and affluent gadget-lovers. However, because the services are nationwide, these categories alone will provide good revenue growth to suppliers through 1985.

Blue-chip organizations find enormous micro need

The Wall Street Journal reports that "Fortune 500 companies are emerging as the next big market for personal computers. The machines are turning up by the score in headquarters and operating divisions—often without the knowledge of the corporations' own data-processing watchdogs—for use in laboratory and financial analysis and text-editing. In recent weeks, some companies have asked manufacturers for quotations on order of hundreds of machines in a single shipment."

Bell & Howell to service Apple

Competitively priced on-site service of Apple computers, including troubleshooting and full warranty repair service, is available from more than 600 Bell & Howell service reps located across the country.

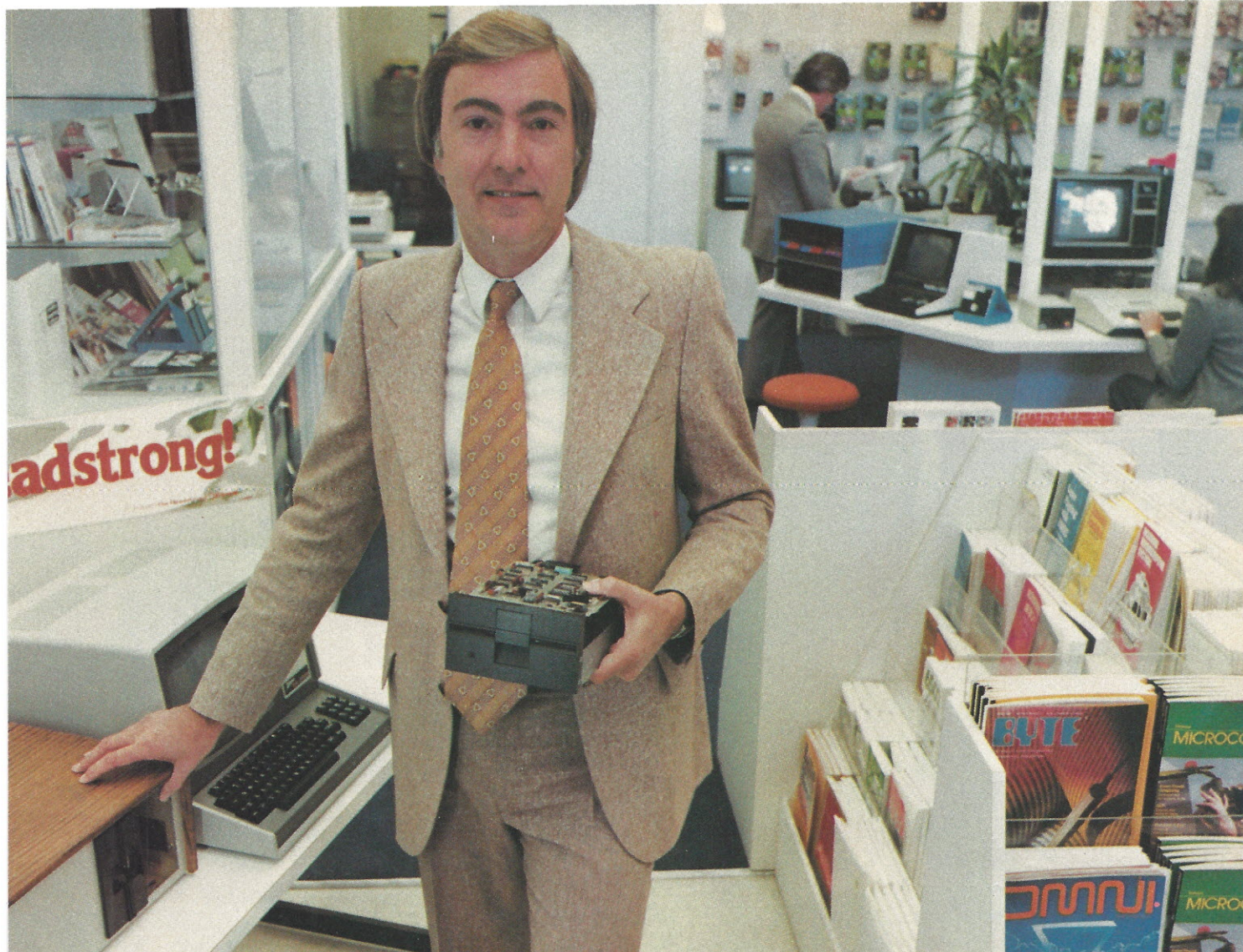
Electronic technicians diagnose problems and repair equipment for industrial, educational, commercial and small business systems.

Japan gains access to 2 data bases

The Japanese government has approved access to the Tymnet network in Japan via international record carriers.

Kokusai Denwa Co., Ltd., Japan's carrier, will operate an advanced Tymnet communications node, installed in Tokyo. The node, which will provide the access in 29 countries, also provides access to Telenet.

The service, called International Computer Access Service, will provide Japanese organizations and subsidiaries of U.S. corporations toll-free access throughout Japan to some 280 computers in the U.S. These computers provide timesharing services, online data-base searching, numerical control, numerical flight planning, plus a variety of other services. □



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Mapping the TRS-80 into the Big Time



Illustrated by Fino Ortiz

by John R. Marler

The time for TRS-80 model I owners (perplexed by Radio Shack's apparent disregard for providing more disk storage) to be in the big time with 8-inch disk drives has finally arrived. Omikron Systems of Berkeley, CA has developed a modification system for the model I that allows the use of normal CP/M.

Nearly everyone knows that CP/M is an (almost) universal operating system for Z80 and 8080 micro-processor systems. One of its key features is that it is debugged and operating in many types of computers throughout the world. Two prominent newsletters partial to the TRS-80 have rumored that Radio Shack will market CP/M instead of TRSDOS for the model II. The running of CP/M protects one's investment in software due to the upward compatibility of CP/M to other computers.

I purchased a system containing Mapper I and Mapper II with two 8-inch Shugart disk drives, which give my model I the same storage as a model II, but with more than \$1,000 in savings. I also found that double-disk operation permits back up and other utility without the hassle of inserting and removing disks (if you have ever inserted the source disk when the disk write part of a backup is in progress, and erased your source disk, you know the need for two or more drives). The hardware contains the electronic boards called Mapper I to utilize RAM as low memory is not located above the ROM where machine activity normally goes on with the TRS-80. This permits the use of "normal" CP/M and makes the world of "real" CP/M available to the model I for the first time.

Mapper II consists of a board, coupled with the disk controller chip, that provides true data separation and eliminates the cause for most disk I/O errors—poorly separated data reading from the mini disk. Mapper I also provides a way of using graphics, and adds cursor control similar to the Soroc 120 CRT terminal, which uses a simple and easy to understand X,Y addressing of the cursor. There isn't a 'print @' statement, but with X,Y addressing we have the next best thing.

Installing the system is simplicity itself—even for someone who can't change a lightbulb without blowing it. The Omikron instructions are easy to understand. The first step is to find the keyboard casing and locate the Z80 chip. The instructions carefully outline where it is. Removal is simply pulling it out of its socket. The Mapper I board is inserted into the now-vacant socket and the Z80 is inserted into a similar socket on Mapper I. Two clamp connectors "wire" the board with surprising strength. This eliminates the need to solder anything. Pull the connector wire through the opening where the interface cable is connected, close the keyboard case, and Mapper I is ready.

In the system I purchased, I requested Omikron to designate drives A and B as mini drives and drives C and D as 8-inch drives. The configuration I purchased was the Mapper boards and two 8-inch Shugart drives in a 2-drive enclosure which places the mini drives on top of the 8-inch drives, forming a surprisingly beautiful configuration. This system sells for \$1800, but to me is worth much more in convenience.

The CP/M disk is configured to your specified memory size and drive configuration. Additional memory or drive configurations are optionally priced at \$10; CP/M version 2.0 is available for an additional \$100. Mini drives are not required for this modification; a system of four 8-inch drives can be ordered. The manufacturer recommends that an immediate backup

be made through the use of 'omcopy.com'. This is invoked by the command 'omcopy all'. The selection of 'A' as source disk and 'B' as destination disk sets up the screen to read:

SOURCE ON A:

DESTINATION ON B:

Press 5 for 35 track, 0 for 40 track

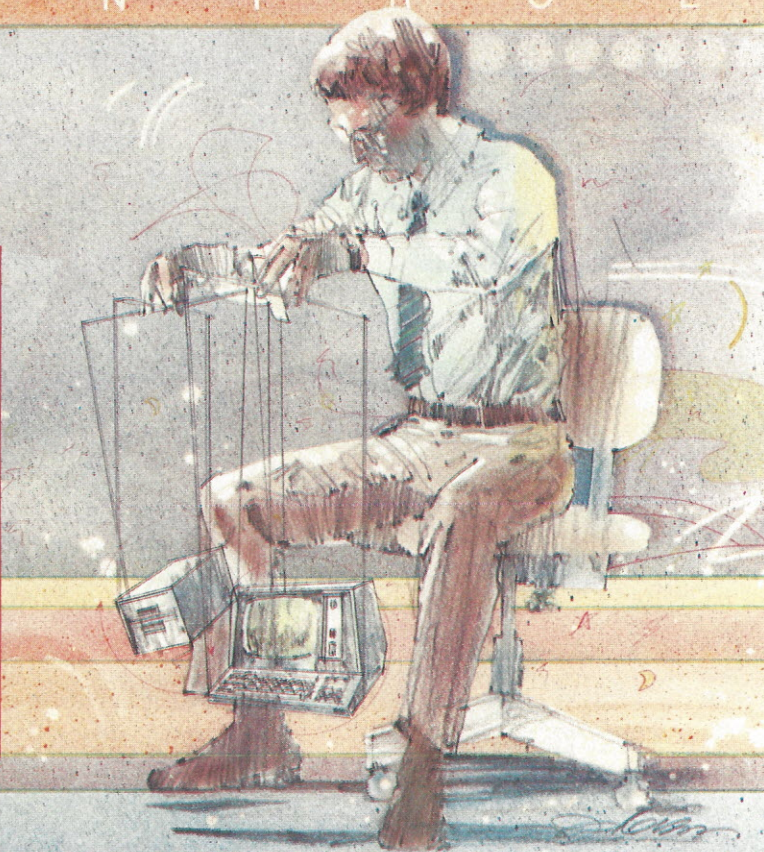
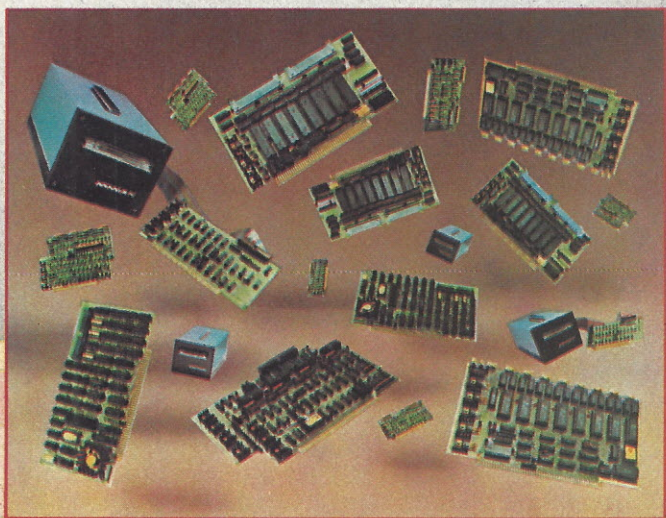
I press 0 (I have MPI 40 track mini drives) and the copy proceeds.

Omikron has provided several utilities to help the customer:

1. 'Setup.com' for customer selection for the following options:
 - a. Permits a deleted character to echo to the screen instead of being removed. This is for certain word processors and programs written for CP/M, which do not delete the character.
 - b. Incorporates automatic line feeds with carriage returns. Again, this is not in the regular CP/M version but is required in some software packages—especially machine language programs.
 - c. Provides for lower-case screen printing (at less than \$20) on units that have this modification. Documentation for this is free from Omikron.
 - d. By enabling lower case, the graphic characters of the unit are also enabled and used in the same manner as level II.
 - e. Allows for printers that do not have form-feed control to utilize the form-feed character in the same manner as disk Basic. This is by keeping an integral counter of lines used and sending out line feeds equal to the page size.
2. 'Lformat.com' formats the 8-inch disk; all disks must be formatted prior to use in any program.
3. 'Mformat.com' formats the 5¼-inch disk; disks must be formatted prior to use.
4. 'Serial.com' if the customer has installed the RS232 board, reads the switch setting of the board, prints the setting on the screen and sets all printer output to the serial printers. This allows for two types of printers to be in use: one for fast copy and one for letter quality.
5. 'Xdir.com' is the XDIR utility modified to read both size disks, show the number of sectors allocated to each program, and show the number of extensions a large file, printed in three columns across the screen, has in the directory.
6. 'Memtest' is an extensive memory test with a minimum time (unless a defective chip is discovered) of 15 minutes for each bank of 16K. It will not only write patterns to the memory chips, but will check the relationship and interaction of the memory locations next to each other.

My modified TRS-80 model I is now working. Due to the data separator that is on Mapper II and used even in the TRSDOS mode, I have eliminated my disk I/O errors and find the disk works easier and smoother. I have modified Wordstar to operate on this system, and have just completed modification to Wordmaster as a replacement for CP/M 'Ed.com' to allow full screen editing without the printing features of Wordstar.

I have been able to run the Osborne accounting systems in addition to some software programs that I have written. Conversion was not difficult. □



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JURISPRUDENT computerist



By Elliott MacLennan
Attorney at Law

Legal Liability and Protection for Software Companies

It is anybody's guess as to whether software is a service or commodity. The classification of software as merchandise would impose upon the software company the additional protection provided in the Uniform Commercial Code. The UCC is applicable in 49 states, except Louisiana. If software is a service, only state contract law applies.

When software is supplied by a software company, it is usually accompanied by an agreement, be it a lease, contract, or license. These three legal documents are generically grouped under contract law. Contract law is state law, rooted in the premise that a breach of promise has somehow occurred (the promise being that the software meets the promised specifications). Additionally, if the UCC applies, this uniform body of law would also be applicable to legally interpret substance of the agreement.

Several prominent commentators have addressed the question of whether software is a service or a commodity. I

believe that the present consensus is that it is a service or process, not merchandise. Nevertheless, some observers point out that applications software packages seem less like service and more like a commodity than customized software.

It is easy for a first-time purchaser of software or a judge reviewing his first computer case to confuse the storage media with the software; or, in other words, mistake the container for the contained. (Many taxing authorities confuse the two on purpose. Object: revenue collection.)

For our purposes, the UCC, where applicable, exposes the software company to additional legal liability brought about by the concept of warranty. The terms "warranty" and absolute "guaranty" are synonymous.

Express warranty is an explicit statement that the claims made for the software are true. For example: "This software will be error-free for one year" assumes that the software company will refund the customer's money or replace the software during the one-year period if software problems occur.

In this case, a simple conclusion would seem to result: the customer or end-user either receives a return of his or her expenditure or receives new software. In actuality, however, advertising brochures, press releases, and program specifications may inadvertently create express warranties which imply liabilities not foreseen by the software company.

Implied warranty arises from the sale or lease of goods under the UCC. A software company need not promise anything for an implied warranty to be present. Under the UCC, there are two implied warranties.

First is merchantability, which in this instance means that the software will perform as specified. This warranty arises from the premise that a purchaser has an inferred promise from the merchant that the goods purchased will be fit for normal use. To the extent that software is a commodity, this warranty has universal application.

The second implied warranty is a promise that the merchandise is suited for its intended use. This will arise in a unique

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NEWDOS/80 is Apparat's latest upgrade to NEWDOS. Features include variable length records, chaining, and drivers specifically configured for Omikron's MAPPER II. \$150.

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MAPPER I adapts the TRS-80 to run the vast library of CP/M software as well as the TRS-80 software. All Lifeboat Software may be ordered for the MAPPER I. All MAPPER I CP/M software is compatible with the CP/M for the Model II. With MAPPER II and 8" drives, the Model I becomes disk compatible with the Model II.

Standard features include lower case support, serial and parallel printer drivers, and an addressable cursor. MAPPER I is supplied with complete utilities including a memory test, a disk test, a copy program, and a proprietary program for converting TRS-DOS files to CP/M files. \$199.

WORD PROCESSING—MAPPER I supports professional word processors like the Magic Wand and Word Star (see reviews in June 80 Kilobaud). Omikron's implementation includes a blinking cursor, auto repeat, shift lock, debouncing, and an input buffer that eliminates missed characters. Magic Wand super discount price \$299.

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See reviews in July 80 and August 80 BYTE By Jerry Pournelle.



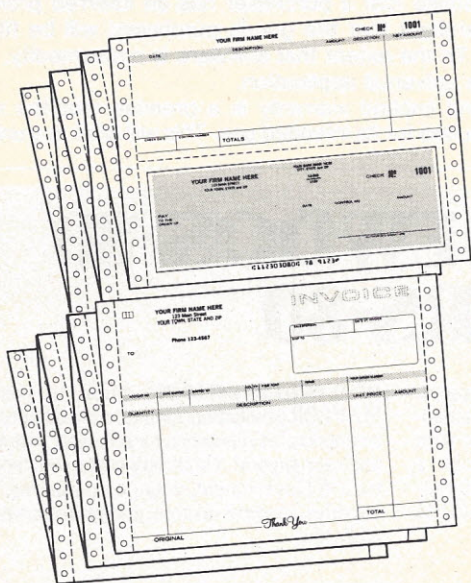


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and troublesome context for the unwary software company if it worked closely with a customer to customize his software. Frequently, if a customer's first contact is with a software company, it or one of its employees may design a configuration compatible with the intended software purchase. The software company may even procure and install the hardware for the customer. If a system defect is found, the "helpful" software company is liable by the implied warranty that the system was supposed to meet the customer's purpose.

Negligence is based on the premise that a civil wrongdoing has occurred which caused harm to a customer. Negligence occurs when the software company and its programming staff violate a standard of care that by law they are expected to maintain.

What standard is owed a customer? One court has already judged a programmer guilty of malpractice—a professional standard ordinarily applied to doctors and dentists. From a layman's point of view, a computer programmer is expected to possess a special type of expertise. When one programmer makes an erroneous recommendation to another programmer, the standard may not apply because both programmers are said to possess equal or similar expertise.

Liability of the Employee Programmer. When a programmer is negligent, one or two unfortunate events may occur. First, the company may choose to sue the programmer directly. Second, the company may seek to recover money damages

The best liability protection a company can have is... a good product and service.

from the programmer that the company had to pay the injured third party. An employee programmer would do well to insert some protective words in his or her employment contract to protect against such actions.

Protection of the Software Company. Many readers would probably agree that the best liability protection a company can have is to provide a good product and good service. If a software error occurs, good service alone may resolve the problem. This is less likely to be true, however, where the customer is experiencing numerous bugs in his system. To the extent that the UCC applies, it permits a merchant to limit his liability and to disclaim any implied warranties when the goods in question are not consumer goods. At this time, it is generally agreed that software is not a consumer good. This situation may change as the mass marketing of software increases. What cannot be disclaimed is personal injury caused by the software, or a disclaimer that would be unconscionable. The best protection is to coordinate all advertising and sales literature with legal documentation.

Acceptance testing is becoming an important consideration in protecting a software company. Does the software company test its software? A court would look to adequacy and thoroughness of testing prior to transferring the software to the customer. To the extent that the customer tests his software (and this should always be encouraged), he may be prevented from claiming a breach of contract or a negligent act or omission because the customer tested and accepted the software.

At this stage in computer law, substantial uncertainties exist as to just what law applies to software, and to what extent. For a software company and its programmers to adequately protect themselves, they should review their legal position, carefully minimize liabilities, and simultaneously attempt to provide maximum customer-oriented documentation. The two procedures are not mutually exclusive. □

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PAGE 1
DATE 06/30/79

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00206	01563	12551	03/16/79	552.92	11.29	564.21 HELD
TOTAL DUE AS OF 04/10/79				552.92		564.21

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EXPLANATION	AMOUNT	INVOICE NO.	AMOUNT
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ers, nails	1,225.22	01556	1,225.22
o	9,955.23	01582	9,955.23
Netting	15,000.25	01616	15,000.25
Switch	100.00	01617	100.00

Switch

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PLEASE PAY THIS AMOUNT		TOTAL DUE 26,430.70

PAGE 2
DATE 06/30/79

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00014	02223	01770	06/10/79	3,381.00	69.00	3,450.00
TOTAL DUE AS OF 06/20/79				52,050.09		52,933.76
00134	02229	00028	06/30/79	1,500.00	0.00	1,500.00
00179	02230	00000	06/30/79	0.00	0.00	0.00
TOTAL DUE AS OF 06/30/79				53,550.09		54,433.76
00223	02233	01882	06/02/79	16,655.24	0.00	16,655.24
PAY TOTAL:				70,205.33	GROSS TOTAL:	71,089.00

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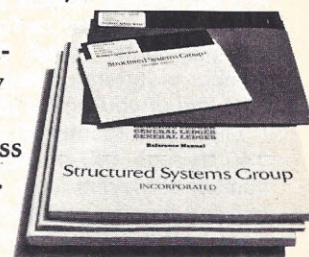
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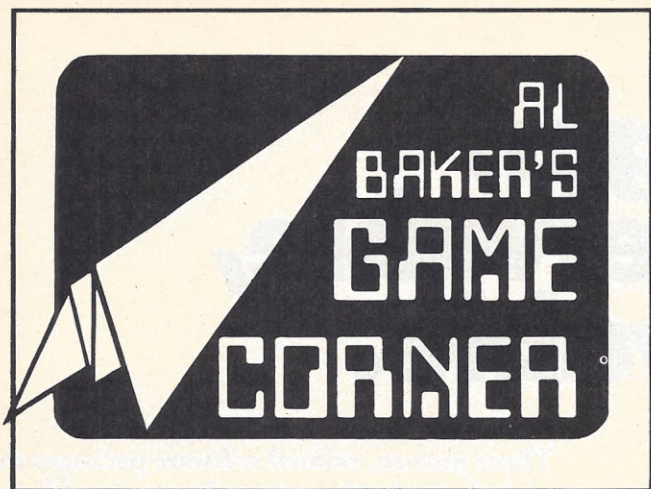
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Structured Systems Group INCORPORATED



The Memory Game

Let's play another educational game. In August we played a physics simulation game. In September it was geometric curves. Both dealt with numbers—"easy" subjects to play with on a computer. It is the soft sciences, the humanities, and the arts which can't be taught on a computer.

Not true! Last month we played a simple history game. It is easy to play and, in a teaching environment, an effective learning aid. This month's game also avoids the stereotype of computers and numbers. While simple, it can be used to improve memory and letter recognition skills. It also encourages the mind to perceive a wider span of the visual field—a must for increased reading speed. Computers can be used to teach many skills having nothing to do with numbers or (ugh!) science and math.

The Memory Game has another feature missing in most computer games. It lets adults and children with unequal abilities to compete equally. The better you are, the harder your problems. Do poorly and your problems become easier. One of the best features of the computer in both the classroom and the home is its ability to mold itself to the player's capabilities. Think of ways to use the power of the computer to create equal competition between unequal opponents in your own games. This not only decreases the frustration of losing by the poorer player, but also helps improve his skill by matching his tasks to his ability.

Two people play. Each is briefly shown three randomly selected letters which he must repeat. If successful, the player scores a point and is given a problem with an additional letter on his next turn. If unsuccessful, his next problem will contain one less letter. This continues for five turns.

At the end of every five turns, a scoreboard displays the number of correct solutions in the last five turns for each player, the total number of correct solutions for each player, and the current number of letters each player is required to guess. This can be as few as one letter. Even a small child can play at that level. Every correct guess increases the number of letters up to a maximum of 32. I strongly suspect that few of you will be able to attain this limit.

Lines 60 through 100 set up the initial conditions and lines 140 through 180 provide the number-of-turns loop and the number-of-players loop. Lines 230 through 280 create the player's problem and let him collect his thoughts and concentrate before beginning. The problem is displayed briefly by lines 300 through 360. Note that a minimum time is established for problems with five or fewer letters. Time is added for each letter over five.

Now the player must make his guess. Lines 400 through 460 accept the player's response and judge it. If he is correct, then lines 510 to 540 update the player's score and in-

crease his difficulty level. If incorrect, lines 770 through 820 decrease his level of difficulty. Line 770 is the safe way to end the 'for-next' loop begun on line 400.

Lines 630 to 720 display the scoreboard. Pressing the 'return' key starts the next round of play.

This concludes the first year of Game Corner. I hope you are enjoying it as much as I am. Please write and give me your opinion or ideas. Next month's game comes from a reader with a good idea. Yours can follow. □

PROGRAM LISTING

```

790 PRI10 REM ... THE MEMORY GAME ...
20 REM
30 REM
40 REM DEFINE CURRENT SCORE, TOTAL SCORE, AND DIFFICULTY
50 REM
60 DIM SC(2), TT(2), NU(2)
70 REM
80 REM INITIALIZE DIFFICULTY AT THREE
90 REM
100 NU(1)=3: NU(2)=3
110 REM
120 REM FIVE TRIES PER ROUND
130 REM
140 FOR TR=1 TO 5
150 REM
160 REM TWO PLAYERS
170 REM
180 FOR PL=1 TO 2
190 CLS
200 REM
210 REM CREATE PROBLEM
220 REM
230 LE$=""
240 FOR I=1 TO NU(PL)
250 LE$=LE$+" "+CHR$(64+RND(26))
260 NEXT I
270 PRINT@282, "PLAYER"; PL
280 PRINT@532, ": INPUT "PRESS ENTER TO GO": A$
290 PRINT@512, CHR$(31);
300 PRINT@512+32-LEN(LE$), LE$
310 REM
320 REM DELAY BASED ON LENGTH OF PROBLEM
330 REM
340 J=250: IF NU(PL)>5 THEN J=NU(PL)*50
350 FOR I=1 TO J: NEXT I
360 PRINT@512, CHR$(31);

```


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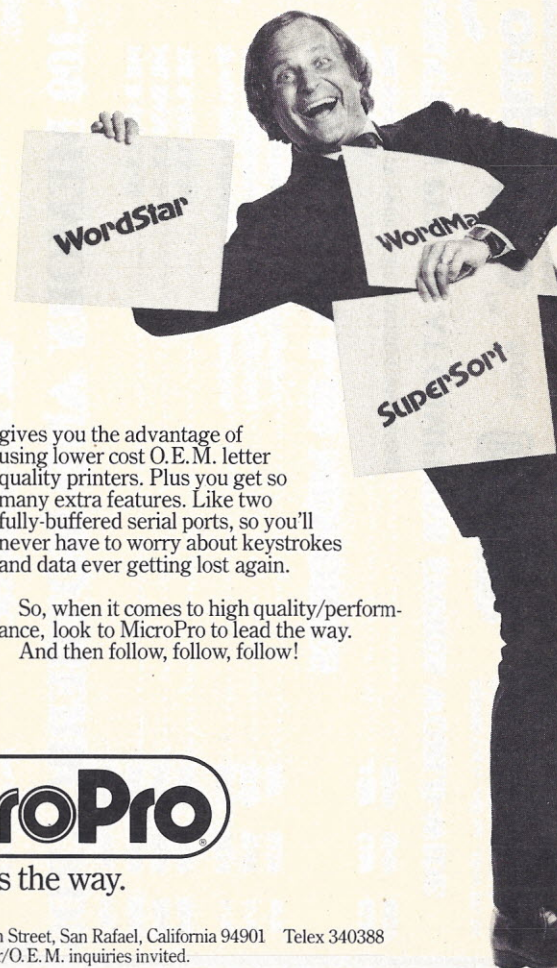
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```

370 REM
380 REM ACCEPT PLAYER'S REPEAT OF SEQUENCE
390 REM
400 FOR I=2 TO NU(PL)*2 STEP 2
410 A$=INKEY$: IF A$="" THEN 410
420 PRINT@606-LEN(LE$)+I,A$:
430 B$=MID$(LE$,I,1)
440 PRINT@542-LEN(LE$)+I,B$:
450 IF A$<>B$ THEN 770
460 NEXT I
470 REM
480 REM PLAYER IS CORRECT
490 REM UPDATE SCORE AND MAKE PROBLEMS HARDER
500 REM
510 IF NU(PL)<33 THEN NU(PL)=NU(PL)+1
520 SC(PL)=SC(PL)+1
530 PRINT@922,"CORRECT"
540 FOR I=1 TO 1000: NEXT I
550 REM
560 REM DO NEXT PLAYER OR TRY
570 REM
580 NEXT PL
590 NEXT TR

```

```

600 REM
610 REM DISPLAY SCORES
620 REM
630 CLS
640 PRINT@270,"SCORE    TOTAL SCORE    CURRENT LETTER COUNT"
650 FOR PL=1 TO 2
660 PRINT@256+PL*64,"PLAYER";PL:
670 TT(PL)=TT(PL)+SC(PL)
680 PRINTTAB(15)SC(PL);TAB(30)TT(PL);TAB(50)NU(PL)
690 SC(PL)=0
700 NEXT PL
710 PRINT@915,;: INPUT"PRESS ENTER FOR NEXT ROUND";A$
720 GOTO 140
730 REM
740 REM PLAYER MADE A MISTAKE
750 REM DECREASE DIFFICULTY
760 REM
770 I=NU(PL)*2: NEXT I
780 IF NU(PL)>1 THEN NU(PL)=NU(PL)-1
790 PRINT@923,"WRONG";
800 FOR I=1 TO 1000: NEXT I
810 A$=INKEY$: IF A$<>"" THEN 810
820 GOTO 580

```

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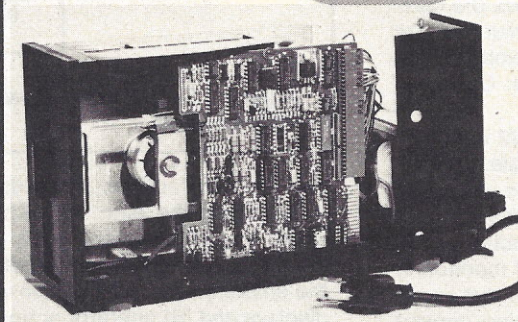
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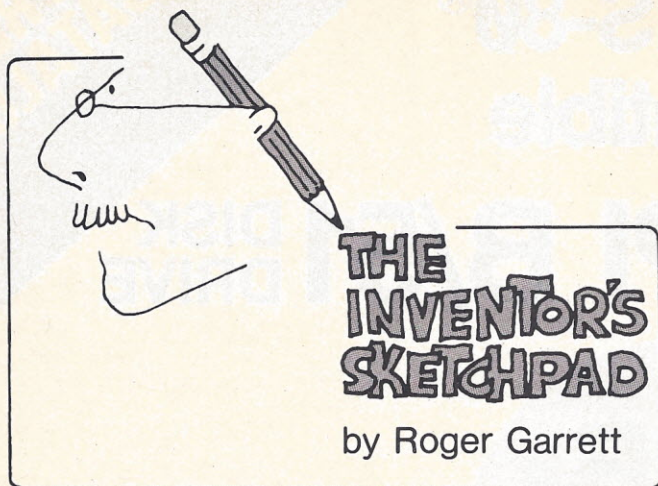
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The CAP (Computer As Partner) Concept

The computer is only a tool that can be used by its operators like a carpenter uses a hammer or a plumber uses a wrench. How often we hear that, coupled with the statement that "computers only do what they are programmed to do" with the emphasis on only, as though it implies something insignificant or limited. I, on the other hand, contend that the ability to tell a computer what to do (using a more flexible definition of programming) is precisely what makes the computer more than a tool. But there is a much more sophisticated concept which the computer can embody: the CAP concept, the use of the computer as partner. Consider, for example, a nuclear power plant.

The task of monitoring the operation of the plant is essentially performed by the operators. Only very simple monitoring is actually done by computer. The computer is restricted to such tasks as sounding an alert when a temperature level is exceeded or when certain hardware malfunctions are detected. The operator is given the major load of monitoring the information on his displays, gauges, etc., and makes his decisions and performs such actions as increasing coolant flow based on the monitored information.

The reasons why the majority of monitoring functions are performed by operators rather than computer are several. First is confidence. This concerns the issue of operator trust in the computer. Before any naturally-human function can be transferred to computer, the operator must sufficiently trust it to perform that function as reliably as he can.

Another is the inability of the software programmers to anticipate all possible situations during the real-time operation of a system. While he may be able to identify the obvious monitoring tasks such as keeping track of radiation levels, it is impossible to pre-identify the obvious monitoring functions that are performed by the operators and are inherently situation-dependent. Only the operator can determine what variables require monitoring in a given situation.

Three problems arise, however, when too much monitoring is assigned or assumed by the operators. First, they can quickly become overloaded with tasks and unable to properly perform the monitoring. Secondly, monitoring tasks tend to be attention-intensive, i.e., an operator watches a gauge or display for an extended period of time. The danger here is that the operator may effectively become "hypnotized" by the display and actually miss the event he is monitoring.

The final problem involves the design and placement of the displays themselves. The display designer attempts to group logically-related information. This may mean placing information physically close together, as with gauges, or grouping them within a given CRT display where the operator can dynamically select a format from a menu of formats.

The problem arises when the operator, due to unforeseen circumstances, needs to monitor several items of information when the display values reside in physically separate loca-

tions or in different user-selectable displays. The best he can do is constantly shift his attention between gauges of flip back-and-forth between display formats.

The obvious solution to these problems is to provide the operator with the ability to dynamically assign monitoring functions to the computer and thereby relieve himself of the responsibilities. Herein lies the basis of computer as partner: the ability to dynamically transfer operator responsibilities to the computer.

Figure 1 depicts a simple view of a typical operating environment. It consists of (1) data base that contains all of the data utilized by the system including data from the sensors

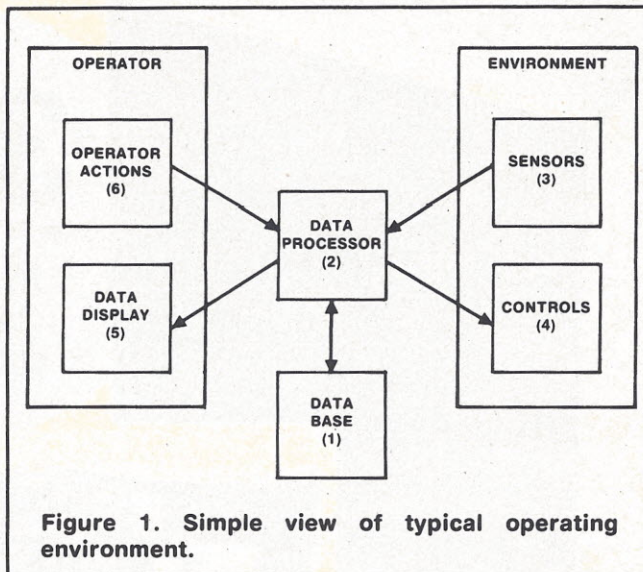


Figure 1. Simple view of typical operating environment.

and operator actions, (2) a data processor (computer) that manipulates the data, (3) sensors that provide information about the environment such as reactor core temperature, electrical load requirements, etc., (4) controls that manipulate the environment, such as turn valves or sound alarms, (5) data displays and (6) operator actions, which are provided via keyboards, dials, and similar hardware. In this setup, the major monitoring functions are handled by the operator, albeit ineffectively as previously noted.

In order to shift some of the monitoring to the computer, we must understand what actually is happening when an operator monitors information. In general, he is watching for certain events to occur. These events can usually be described in terms of values of variables. For example, he may be watching for a temperature to exceed some specific value or for a hatch indicator to show that the hatch is closed. He is not watching the hatch itself, only the value of a variable which indicates that the hatch is open or closed. Essentially he wants to know when an event occurs.

In order to provide the operator with the means to tell the computer to do the monitoring, I propose to provide him with a 'tell me when' command.

This allows the operator to transfer specified monitoring functions to the computer. We assume that the method of issuing the command takes the form of a typed command, although a more sophisticated system could provide spoken commands.

The command itself has the following general format:

'TELL ME WHEN' event:description

The event:description may be any of the following:

event:description operator event: description
data:base:variable:name
numerical:constant
logical:constant

An operator may be one of the following: and, or, not, is less than, is greater than, is equal to, is not equal to, is, is not, divided by, multiplied by. A data:base:variable:name may be

any defined word or phrase (a set of words) associated with a unique variable or constant within the data base. A numerical: constant may be any of the following:

digit
digit digit
numerical:constant decimal:point numerical:constant
sign numerical:constant

A digit is defined as any number zero to nine. A sign is + or -. And finally a logical:constant is either a 'true' or 'false'. In each of the above descriptions, words in all capitals indicate words to be typed or spoken as is. Lower-case words indicate options.

With such a command the operator can issue statements to the computer such as:

TELL ME WHEN THE UPPER HATCH IS SHUT.

(Assuming that 'the upper hatch' is the associated name of a data base variable with possible values of 'true', indicating open, and 'false' indicating 'closed', and 'shut' is the associated name of a data base constant whose logical value is 'true'.)

Now let's look at figure 2 to see what additions are required in order to implement the 'tell me when' function, and what actually occurs when the command is issued.

The command interpreter is much like the expression evaluator portion of a compiler. It checks the input string for proper syntax, i.e., makes sure that individual words of the command are in a valid sequence. The interpreter checks to assure that the specified data base variables and constant names actually exist. If either of these checks fail, and the interpreter cannot make a reasonable guess at what was meant by the command, the operator is notified of a command failure and no further processing is done.

If the checks succeed, however, event:description is formatted and transferred to the event list. Each entry in this list consists of an event description, i.e., the logically evaluable expression which described the event.

The monitor is an independent process, either in the form of a time-interrupt-driven background process or a parallel processor, which sequentially accesses the individual event list entries. It takes each event description and evaluates it. If it evaluates to a logical 'false', it simply moves to the next event description in the list. If it evaluates to a logical 'true', however, it has successfully detected the occurrence of the

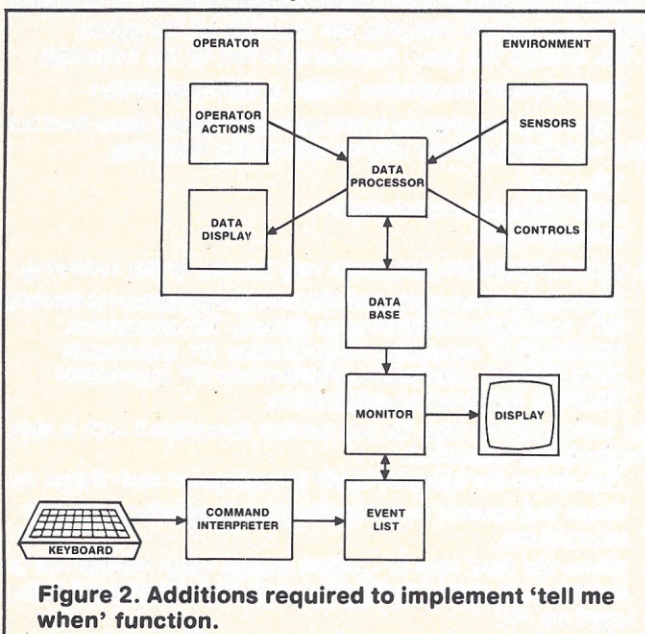


Figure 2. Additions required to implement 'tell me when' function.

specified event. It then notifies the operator that the event has occurred by formulating a sentence of the form:

ATTENTION, event:description.

and sending it to the display or enunciating it via a voice syn-

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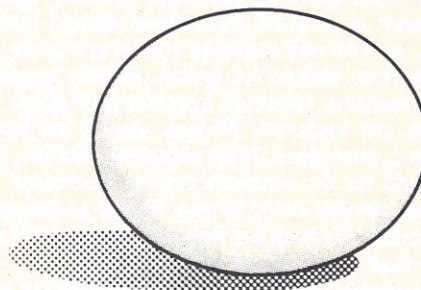
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thesizer, and finally it deletes the event: description from the event list.

Assume that we issue the command:

TELL ME WHEN THE UPPER HATCH IS SHUT.

The command interpreter checks the string for proper syntax and the existence of the variables and constants. It recognizes 'tell me when' as the key phrase indicating that an event description follows. It recognizes the word 'is' as an operator and recognizes that the phrases before and after 'is' are not numerical or logical constants and, therefore, must be names of data base variables or constants.

It searches the data base and recognizes that 'the upper hatch' is a data-base variable and retrieves a pointer to it (which we will call 'uhpointer'). It recognizes that 'shut' is a data-base-defined constant equal to 'true'. It verifies that the logical operator 'is' is indeed operating on two logical data namely 'the forward hatch' and 'shut'. It then produces the executable event description 'uhpointer.and.true' and stores it into the event list.

Functions of the monitor

Periodically the monitor accesses the upper hatch event descriptor and executes it. It does this by taking the value from the data base pointed to by 'uhpointer' and performing a logical 'and' operation on that value and the logical 'true' value. If the result of this operation is a logical 'false', the monitor simply goes on to the next event descriptor in the list, eventually to return and reexecute the upper hatch descriptor.

If, on the other hand, the expression evaluates to a logical 'true', the monitor has successfully detected the occurrence of the specified event, the upper hatch is indeed now shut. The monitor generates the text string 'attention, the upper hatch is shut.' (which it simply produces by reconstructing the text from the event description in the event list) and sends it to the display or the voice synthesizer which transforms it into the appropriate phonetic string and enunciates the statement. Finally, the monitor deletes the upper hatch descriptor from the event list since it has detected the event and no longer has to check for it.

After such a system has been implemented and the operators have confidence in it, additional responsibilities can be transferred to the computer. The next step is to allow the computer to take specific actions when an event is detected rather than simply notifying the operator of the action.

We change the basic command format to the following:

WHEN event: description THEN action: description.

The event: description is the same previously described but the action: description may be any of the following:

TELL ME
data: manipulation: statement
action: phrase

A data: manipulation: statement may be any of the following:

data: manipulation: statement AND data: manipulation: statement
SET data: base: variable: name EQUAL: TO expression
INCREMENT data: base: variable: name BY expression
DECREMENT data: base: variable: name BY expression
NEGATE data: base: variable: name

An action: phrase may be any phrase associated with a data manipulation statement.

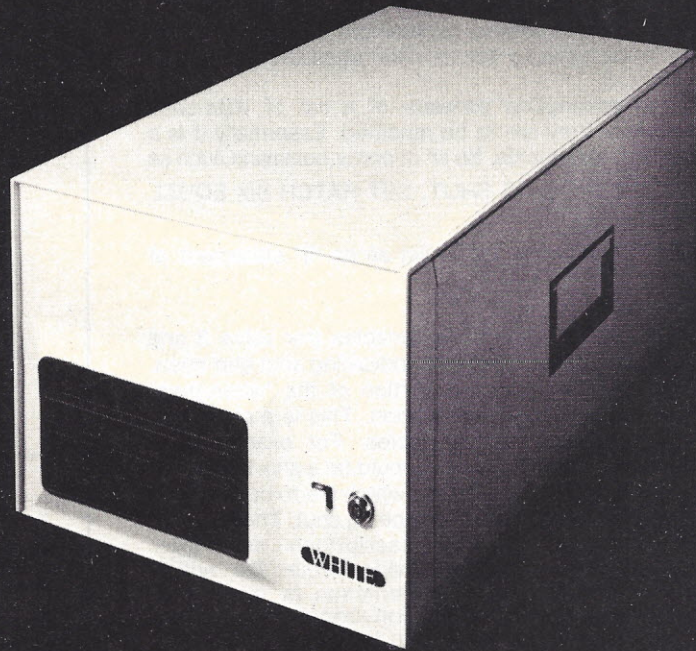
This allows the operator to tell the computer such things as:

When the reactor core temperature is greater than 200° then tell me.

When the flow rate of coolant supply tube number six is less than 10, increment the flow rate of coolant supply tube eight by 15.

When valve three is shut then open valve five and sound the alarm.

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Obviously the commands can get quite sophisticated, as if the operator were talking to another person rather than the computer.

Figure 3 shows the system modifications for the 'take action' extension. The command interpreter must recognize the 'when-then' command format. Specifically it must be able to interpret the action:phrase. The event list is expanded into an event/action list so that each entry contains not only the event description (evaluable expression) but also contains the actions to be taken by the monitor when the associated event is detected.

Each action description consists of a list of data-base variables and how they are to be modified. Essentially it is a set of assignment statements. So an operator command such as

WHEN VALVE THREE IS SHUT, SET HATCH SIX EQUAL TO OPEN.

is essentially put into the action list as an 'if' statement of the following form:

IF V3 = S THEN H6 = O

where V3 and H6 are data base variables (for valve 3 and hatch 6) and S and O are constants indicating shut and open.

Notice that the action:phrase portion of the 'when-then' command may be an action:description. This is a shorthand way of modifying data base variables. For example, the action:description 'close the hatch' could be a shorthand way of specifying the data-base variables which are to be modified and which result in the hatch actually being shut. The associations between these action:descriptions and their data:manipulation:statements are made within the action association list. In an initial implementation of this list, it would contain a set of predefined action associations such as the one to 'sound the alarm' or 'close the hatch'.

In a later implementation, however, we would provide the operator with the ability to dynamically create his own associations so that he could use his own shorthand method of issuing commands. This command definition command has the following format:

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UNDERSTAND action:description TO MEAN command.

where the action:description must be a unique previously undefined phrase not containing key words. The command may have the form 'command AND command' or it may be any data:manipulation:statement or previously defined action:-

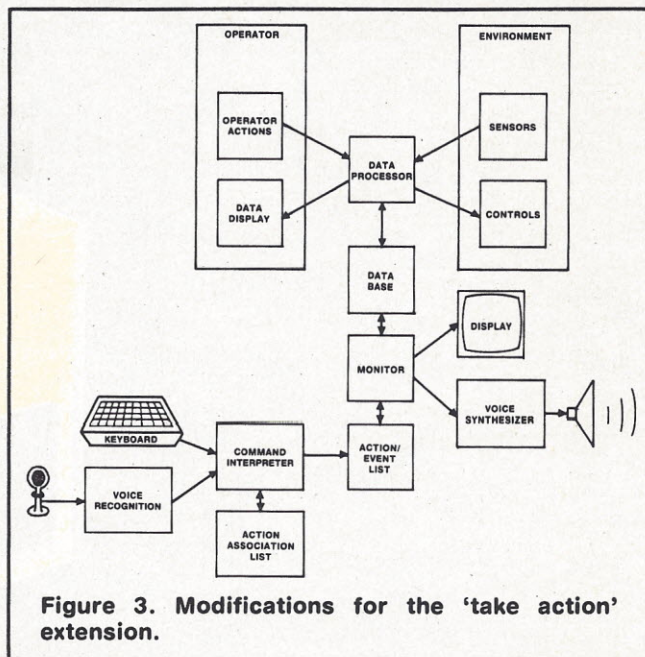


Figure 3. Modifications for the 'take action' extension.

description, or 'when-then' command.

Note that by allowing 'when-then' and action:description phrases as the command which is associated with the action:description, the operator can build extremely sophisticated command sequences to be performed when he subsequently issues the action:description phrase as a command.

Several additional operator commands will be necessary to provide full flexibility to the user:

WHAT ARE YOU DOING?

The system would respond by listing the event which currently reside in the event/action list.

STOP event:designator

This would direct the system to remove a specified entry from the event/action list so that it would no longer be performed by the monitor.

CONTINUOUSLY command.

This would tell the system to perform the command (presumably and action:description or 'when-then' command) but not to delete the associated event/action item from the list when the event is detected. This effectively tells the system to detect every occurrence of the event, not just the next one.

ERASE action:description.

This directs the system to delete an entry from the action/ association list.

What we have built, then, is a computer system that works with the operator as a partner. The operator uses the computer not merely as a tool. He can actually transfer responsibility to it in dynamic fashion so that it assists him, working together as a team. The carpenter building a house needs more than a hammer; he needs assistance from fellow workers. The operator running a nuclear power plant or controlling a manufacturing process needs more than simple tools; he too needs assistance. The computer clearly can fulfill both these needs. It can be his tool and his partner. □

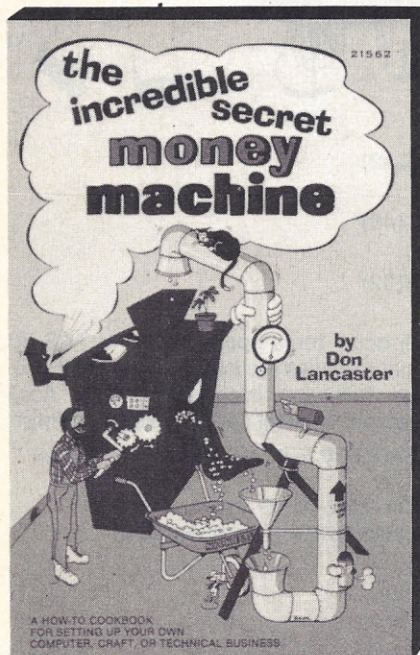
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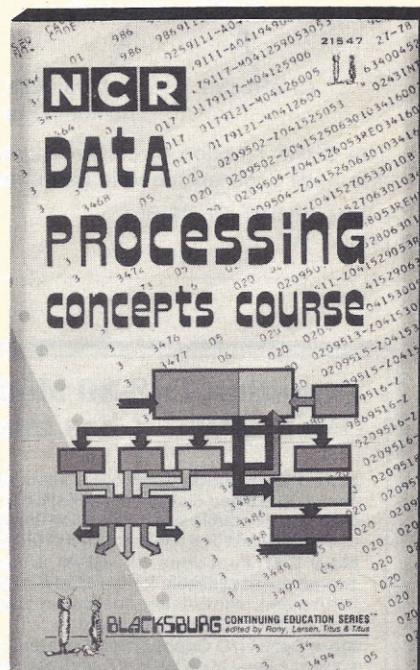
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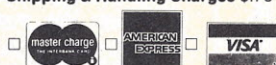
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```

130 IF POS(1) = 0 THEN PRINT
140 NEXT CODE
150 GOTO 150

```

We suspect that you may have some difficulty understanding lines 120 and 130. Relax, help is on the way.

When the TRS-80 prints a whole number such as 129 or 130 or 191, it prints a space, then the digits of the number, then a space. So, a 3-digit whole number will occupy exactly five printing positions on the screen.

A graphics character occupies exactly one space on the screen. A space (Ascii code 32) occupies exactly one space on the screen.

With all that in mind, lets look at line 120. Remember, the value of 'code' is a 3-digit number.

```
120 PRINT CODE CHR$(CODE) CHR$(32) CHR$(32);
```

Add 'em up. $5 + 1 + 1 = 8$ printing positions. Now recall that the width of the screen is exactly 64 positions. Aha! $64 \div 8 = 8$, so eight sets of code characters will be printed across the screen.

This brings us to POS(1) in line 130. POS(1) tells you where the cursor is. After printing eight things, eight times, the cursor will be in position 0 (left edge of the screen) on the next line. So, line 130 will at that time cause an empty line to be printed. We do this simply to make the stuff on the screen easier to read and, of course, to introduce to you the POS function.

POS(1) will be a number from 0 to 63 showing where the cursor is. The value 0 means the cursor is at the left edge of the screen. The value 63 means that the cursor is at the right edge of the screen. In between is...well, in between.

Your turn. Try some Ascii codes from 0 to 31. Experiment with them. Next time we will play with some of these codes.

It's play time again. Last time, we showed you a simple game called Guess My Letter using the ASC function. This time, we will do the same game using the CHR\$ function.

```

100 REM ** GUESS MY LETTER GAME
110 CLEAR 200
120 A$ = "YOU GUESSED MY LETTER!!!"
130 B$ = "TRY CLOSER TO THE BEGINNING OF THE ALPHABET"
140 C$ = "TRY CLOSER TO THE END OF THE ALPHABET"
200 REM ** EXPLAIN GAME TO PLAYER
210 CLS
220 PRINT "I'M THINKING OF A LETTER FROM A TO Z."
230 PRINT "GUESS MY LETTER!!!"
300 REM ** COMPUTER 'THINKS' OF A SECRET LETTER
310 X = RND(26) + 64
320 X$ = CHR$(X)
400 REM ** GET GUESS (G$). IS IT A LETTER?
410 PRINT : INPUT "YOUR GUESS (A TO Z)"; G$
420 IF G$ < "A" PRINT "GUESS A LETTER!": GOTO 410
430 IF G$ > "Z" PRINT "GUESS A LETTER!": GOTO 410
500 REM ** COMPARE GUESS WITH SECRET LETTER
510 IF G$ = X$ THEN PRINT A$: GOTO 610
520 IF G$ < X$ THEN PRINT C$: GOTO 410
530 IF G$ > X$ THEN PRINT B$: GOTO 410
600 REM ** WINNER. ASK FOR REPLAY
610 PRINT : PRINT "TO PLAY AGAIN, PRESS SPACE BAR"
620 KEY$ = INKEY$: IF KEY$ = " " THEN 620 ELSE 630
630 IF KEY$ = " " THEN 210 ELSE 620
999 END

```

Look at lines 310 and 320. The value of X (in line 310) will be the Ascii code for a letter. Line 320 converts this to a string value for the string variable, X\$.

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Learning with Micros

by Lou Frenzel

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Obviously, the next step is to shop around for some teaching programs. What you don't know is that this is going to be the hardest part of the project. In fact, it may just put an end to your plans before they begin.

You talk with the computer manufacturer and find that it has a few pieces of educational software...none of it suitable for you. The manufacturer's users group yields one program only partially useable. You are still a long way from getting your software.

Next you turn to software magazines. You circle the bingo cards, write letters, make phone calls and even order an item or two. The result is a pathetic collection of trivial software.

You finally realize that either you are going to have to write all the software yourself or abandon the project. You now have discovered what other teachers have discovered before you: While microcomputers are cheap and plentiful and funds are available to buy them, there is little or no useful teaching programs to go with them.

Time to discover Conduit. This is an organization that specializes in procuring, developing and supplying instructional programs for computers...a superior source. Conduit, a non-profit part of the University of Iowa, was formed in 1971 by five major university computing centers to find ways of identifying, cataloging and sharing computer-based educational materials. Its initial efforts were supported by the National Science Foundation; in 1977, the Exxon Educational Foundation provided additional help. Over the years, it has built an impressive library of computer teaching programs which it sells to anyone.

The organization's primary objective is to develop and distribute high quality computer-based instructional programs. It currently offers a wide range of teaching packages for college undergraduate courses consisting of a computer teaching program on magnetic disk or tape, a student guide with objectives and methods of use, an instructor's guide illustrating material use, and instructions on how to load and use the program.

All programs are written in Fortran or Basic, and can be supplied in a variety of media. Most of the programs are designed for main-frame and minicomputers. But in the past two years, it has made a major leap into micros. A number of programs are currently available for TRS-80, Apple and PET.

Programs cover a broad spectrum: biology, chemistry, economics, education, geography, humanities, management, mathematics, physics, sociology, political science, psychology and statistics. The teaching programs range from the basic programmed tutorials to sophisticated simulations. None of it is trivial. Prices-per-package range from \$5 to \$150.

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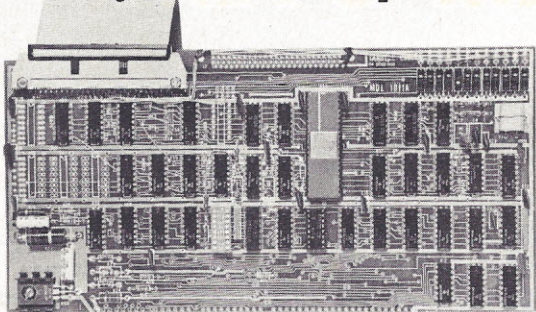
For Fortran, it sticks to the Ansi 1966 standards. For Basic, a set of definitions for three levels (0, 1 and 2) of dialects. By programming in one of these dialects, applicable to most Basic, transferability is assured. If a program is not available for a specific computer, you can order the listing and, with a little effort, convert the program yourself.

Most programs come from outside authors, which work with series editors to ensure that the programs are of the highest quality. It takes approximately 6 to 9 months to review a package and another 6 to 12 months to fully test and document it. While this publishing cycle takes long, it is necessary to achieve the desired quality. Authors receive a 15% royalty.

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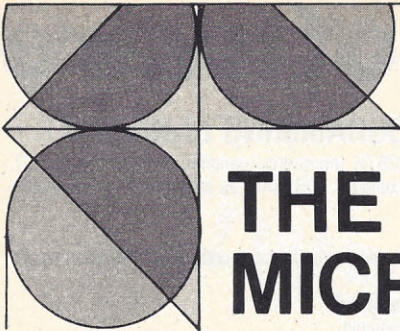


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THE MICRO-MATHEMATICIAN

by Richard R. Parry

Point Plotter and Statistical Analysis Package

Plotting a graph is, at best, tedious. Just preparing the axes so that data fits in a neat, accurate manner is a burden. And even when the graph is finished, the job is often incomplete for, in order to draw inferences from the data, a statistical analysis is required. Even a simple calculation, such as the mean, takes some time when working with a large amount of data.

The program offered here takes the labor out of both the analysis and plotting of data. The plotting routine has many powerful features including the ability to plot in all four quadrants and print multiple values of Y for a particular value of X. It also allows data to be stored in a file to be retrieved or altered at a later date.

In many applications, this feature is a virtual necessity. The statistical analysis of the data includes the calculation of such statistics as the low and high values of the data, as well as the range, mean, variance, and standard deviation. These statistics do not constitute a definitive analysis. They do, however, form the nucleus for analysis.

The program shown in listing 1 was written in technical systems consultants Basic using its Flex version 2.0 disk operating system.

Using the program

Figure 1 shows the actual analysis of electrical energy consumed in a home over a 2-year period. When the program starts, it requests the user to supply an X and Y data prompt. In the example, MO. (month) and KWH (kilowatt-hours) represent the X and Y data prompts respectively. Having the program prompt the user with MO. and KWH is more meaningful than X and Y.

When the prompts are initialized, the program enters the input data mode. It is at this point that the user supplies data or requests a number of possible options. The options are: backup, calculate statistics, table of elements, edit, plot graph, retrieve data file, store data file, and done. These may be evoked by inputting the entire command or merely the first character. For example, the graph may be plotted by typing 'plot graph' or P.

The program prompts the user for the month (X variable) and the user responds with a number. In figure 1, month number 1 represents the electrical energy used in October 1977; month 24, the energy in October 1979. Note the use of the 'backup' command for month 13. The user incorrectly entered the month as 133. While one may continue and edit this data element later, it is more convenient to merely backup one element and reenter the data.

With all the data entered, it is a good idea to check it for errors before any further data manipulation. The 'table' command initiates the data display. If an error shows, the user may use the 'edit' command to alter one or more elements.

In the example, the number of kilowatt-hours for month 4 was actually 9560, not 9160 which was inputted. After typing 'edit' (or E), the program prompts the user for the variable to

be changed (X or Y), then prompts for the specific element number to be altered. Lastly, the program asks for the new value. When all corrections are made, the user returns to the input data mode by inputting 'return' or R.

Conceptualizing the data is made easier by plotting. After typing 'plot', the program asks the user to specify the lower and upper limits of X, as well as the X increment. For the example, the lower and upper limits are 1 and 24, respectively, and the increment is one month. In order to make the graph more meaningful and easier to read, the user is asked to label both axes. The X axis is labeled 'month 1 is Oct 1977'. The Y axis is labeled 'energy in kilowatt-hours'.

Choice of data statistics

The statistical analysis mode permits analysis by inputting 'calculate statistics' (or C). Once this is entered, the user has the option of receiving a statistical analysis of the X or Y data group. In figure 1, the data to be analyzed is kilowatt-hours (Y data group). Figure 2 will show when and why to analyze the X data group.

The statistics allow one to draw conclusions or possible inferences about the data. For example, the energy used by the home was lowest for months 22 and 23 (July and August 1979); and highest for month 3 (December 1977). In addition,

```
X AXIS PROMPT? MO.
Y AXIS PROMPT? KWH
```

```
*** INSERT DATA MODE***
```

```
MO.( 1 )=? 1
KWH( 1 )=? 3640
MO.( 2 )=? 2
KWH( 2 )=? 5840
MO.( 3 )=? 3
KWH( 3 )=? 10860
MO.( 4 )=? 4
KWH( 4 )=? 9160
MO.( 5 )=? 5
KWH( 5 )=? 10200
MO.( 6 )=? 6
KWH( 6 )=? 6160
MO.( 7 )=? 7
KWH( 7 )=? 4120
MO.( 8 )=? 8
KWH( 8 )=? 2280
MO.( 9 )=? 9
KWH( 9 )=? 1480
MO.( 10 )=? 10
KWH( 10 )=? 1480
MO.( 11 )=? 11
KWH( 11 )=? 1040
MO.( 12 )=? 12
KWH( 12 )=? 1560
MO.( 13 )=? 133
KWH( 13 )=? 8
MO.( 13 )=? 13
KWH( 13 )=? 2840
MO.( 14 )=? 14
KWH( 14 )=? 5880
MO.( 15 )=? 15
KWH( 15 )=? 10760
MO.( 16 )=? 16
KWH( 16 )=? 10040
MO.( 17 )=? 17
KWH( 17 )=? 8760
MO.( 18 )=? 18
KWH( 18 )=? 7060
MO.( 19 )=? 19
KWH( 19 )=? 4400
MO.( 20 )=? 20
KWH( 20 )=? 2040
MO.( 21 )=? 21
KWH( 21 )=? 1200
MO.( 22 )=? 22
KWH( 22 )=? 1000
MO.( 23 )=? 23
KWH( 23 )=? 1000
MO.( 24 )=? 24
KWH( 24 )=? 1160
MO.( 25 )=? TABLE
```

```
*** TABLE OF ELEMENTS***
```

```
MO.( 1 )= 1      KWH( 1 )= 3640
MO.( 2 )= 2      KWH( 2 )= 5840
MO.( 3 )= 3      KWH( 3 )= 10860
MO.( 4 )= 4      KWH( 4 )= 9160
MO.( 5 )= 5      KWH( 5 )= 10200
MO.( 6 )= 6      KWH( 6 )= 6160
MO.( 7 )= 7      KWH( 7 )= 4120
MO.( 8 )= 8      KWH( 8 )= 2280
```



```

REM  MERGE SORT USING LINK () FOR INDEX
FUNCTION  MERGE (I,J=INTEGER)=INTEGER
  VAR T,KM,M=INTEGER
  IF ARRAY (I) < ARRAY (J) THEN
    BEGIN
      M=I
      I=J
      J=M
    END
  T=I
  KM=T
  I=LINK (I)
  WHILE I<>0 DO
    BEGIN
      IF ARRAY (I) < ARRAY (J) THEN
        BEGIN
          M=I
          I=J
          J=M
        END
      LINK(KM)=I
      KM=I
      I=LINK(I)
    END
  LINK(KM)=J
  END=T
FUNCTION  SORT(IS,JS=INTEGER)=INTEGER
  VAR KS,II,JJ=INTEGER
  IF IS=JS THEN
    BEGIN
      LINK(IS)=0
      RETURNED VALUE=IS
      GOTO  OEND
    END
  KS=IS+((JS-IS)/2)
  II= SORT(IS,KS)
  JJ= SORT(KS+1,JS)
  RETURNED VALUE= MERGE(II,JJ)
OEND
END= RETURNED VALUE

```

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```

MO.( 9 )= 9      KWH( 9 )= 1480
MO.( 10 )= 10     KWH( 10 )= 1480
MO.( 11 )= 11     KWH( 11 )= 1040
MO.( 12 )= 12     KWH( 12 )= 1560
MO.( 13 )= 13     KWH( 13 )= 2840
MO.( 14 )= 14     KWH( 14 )= 5880
MO.( 15 )= 15     KWH( 15 )= 10760
MO.( 16 )= 16     KWH( 16 )= 10040
MO.( 17 )= 17     KWH( 17 )= 8760
MO.( 18 )= 18     KWH( 18 )= 7060
MO.( 19 )= 19     KWH( 19 )= 4400
MO.( 20 )= 20     KWH( 20 )= 2040
MO.( 21 )= 21     KWH( 21 )= 1200
MO.( 22 )= 22     KWH( 22 )= 1000
MO.( 23 )= 23     KWH( 23 )= 1000
MO.( 24 )= 24     KWH( 24 )= 1160

```

INSERT DATA MODE

MO.(25)=? EDIT

EDIT MODE, TYPE R TO RETURN

DO YOU WISH TO EDIT X OR Y ELEMENT? Y

WHAT ELEMENT NUMBER N=? 4

NEW ELEMENT VALUE Y 4 =? 9560

DO YOU WISH TO EDIT X OR Y ELEMENT? RETURN

INSERT DATA MODE

MO.(25)=? PLOT

PLOT MODE

LOWER LIMIT OF X=? 1

UPPER LIMIT OF X=? 24

INCREMENTS OF X=? 1

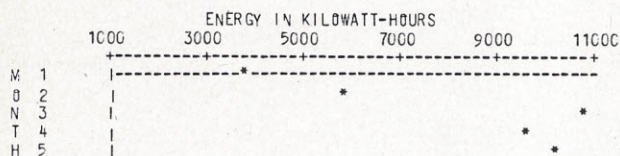
X AXIS LABEL=? MONTH 1 IS OCT 1977

Y AXIS LABEL=? ENERGY IN KILOWATT-HOURS

Y INCREMENT= 200

Y AXIS AT X= 1

X AXIS AT Y= 1000



INSERT DATA MODE

MO.(25)=? CALCULATE STATISTICS

*** CALCULATE STATISTICS MODE ***

WHAT DATA GROUP (X OR Y)? Y

DATA GROUP IS KWH THEREFORE MO. WILL NOT BE USED.

LOW KWH= 1000

HIGH KWH= 10860

RANGE = 9860

SUM OF KWH= 114580

MEAN = 4774.17

VARIANCE = 1.29394E+07

STANDARD DEVIATION = 3597.13

INSERT DATA MODE

MO.(25)=? STORE DATA

NAME OF DATA FILE TO BE STORED ? ELEENERGY

INSERT DATA MODE

MO.(25)=? DONE

Figure 1. All possible commands and how to use them for data representing electrical energy consumption in a home over a two-year period.

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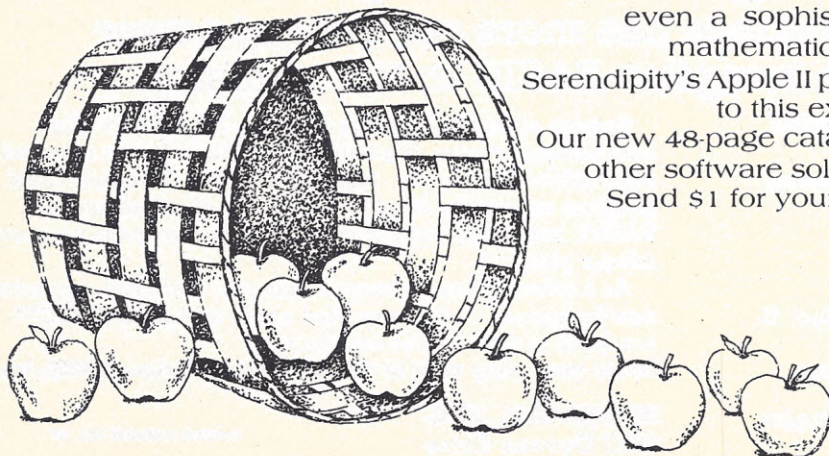
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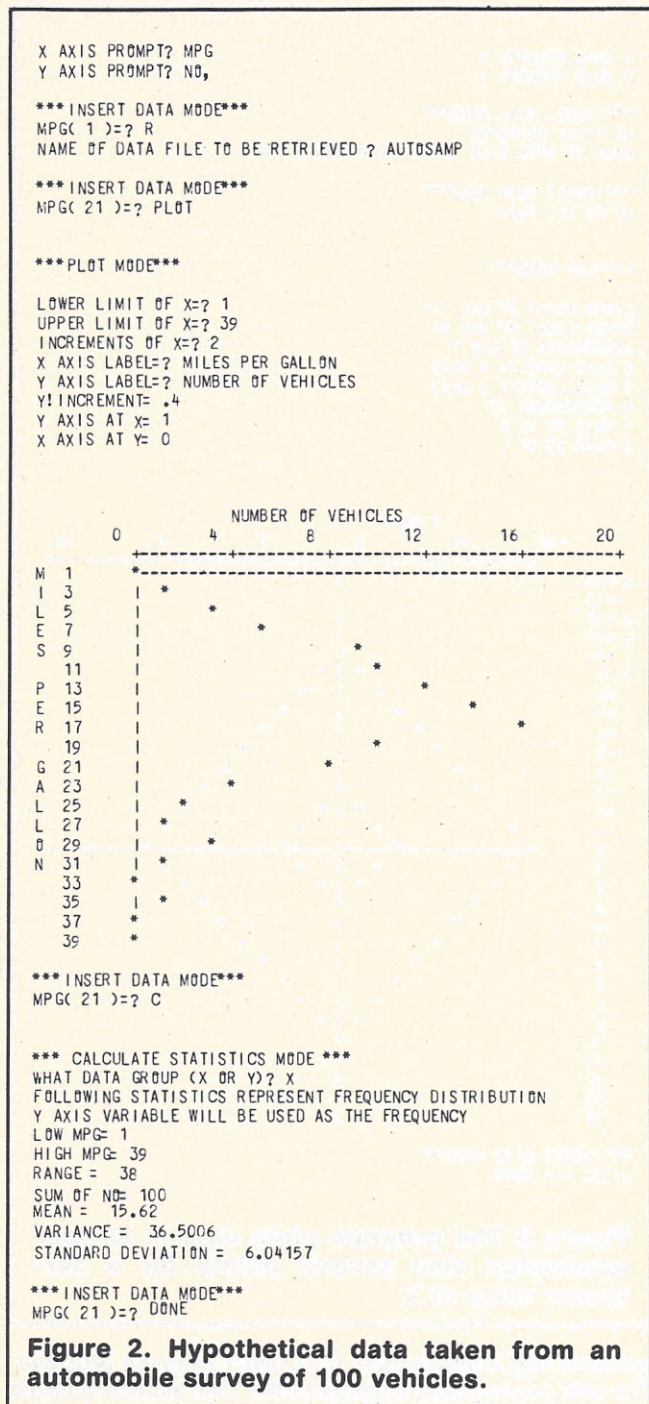


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the average energy used each month was 4774.17 kwh. Variance and standard deviation indicate additional information about the distribution.

In many cases, such as the present study, the user will want to store the data for referral at a later date (most likely the following month). Additional energy consumption information can be appended to the existing data. The 'store' command causes the program to request a data file name from the user. A practical use of this technique is to create a data file for each heating season. In this way, one can examine variations in energy use.

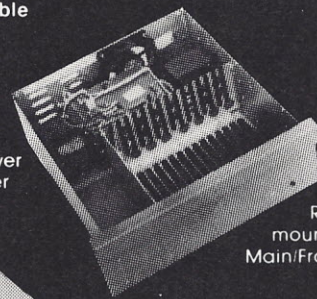
Figure 2 shows hypothetical data taken from a sample of 100 automobiles. The graph is called a frequency distribution. The X axis indicates the center of a 2-miles/gallon range and



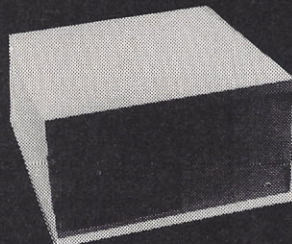
the Y axis indicates the number (frequency) of vehicles falling into that range. For example, three cars in the survey had an mpg rating between 4 and 6. In analyzing this data, the variable is mpg, which is plotted on the X axis. Therefore, the data group to be analyzed is X (mpg). In figure 1, the data

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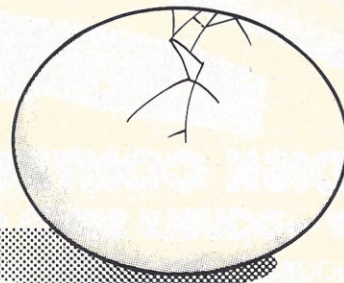
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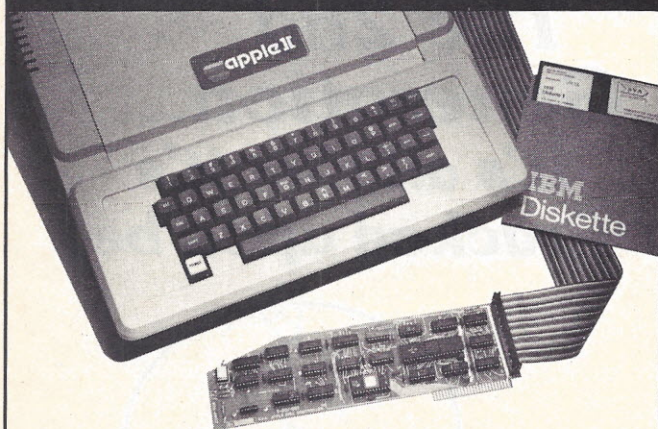
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group analyzed was kilowatt-hours (the Y data group). When analyzing the X data group in figure 2, the Y axis is assumed to contain the frequency of the data.

Figure 3 illustrates the ability of the program to plot data in all four quadrants. It also shows the ability of the plotter to plot several values of Y for a specific value of X.

About the program

REM (remark) statements are used throughout as a form of documentation. However, there are a few points worthy of further explanation.

The first statement (line 10) is the dimension statement used to indicate the amount of memory the computer should set aside for the X and Y data pairs. The statement 'dim X (60), Y (60)'

```
X AXIS PROMPT? X
Y AXIS PROMPT? Y

***INSERT DATA MODE***
X( 1 )=? RETRIEVE
NAME OF DATA FILE TO BE RETRIEVED ? BOX

***INSERT DATA MODE***
X( 53 )=? PLOT

***PLOT MODE***

LOWER LIMIT OF X=? -14
UPPER LIMIT OF X=? 14
INCREMENTS OF X=? 1
X AXIS LABEL=? X AXIS
Y AXIS LABEL=? Y AXIS
Y INCREMENT=? .5
Y AXIS AT X= 0
X AXIS AT Y= 0
```



```
***INSERT DATA MODE***
X( 53 )=? DONE
```

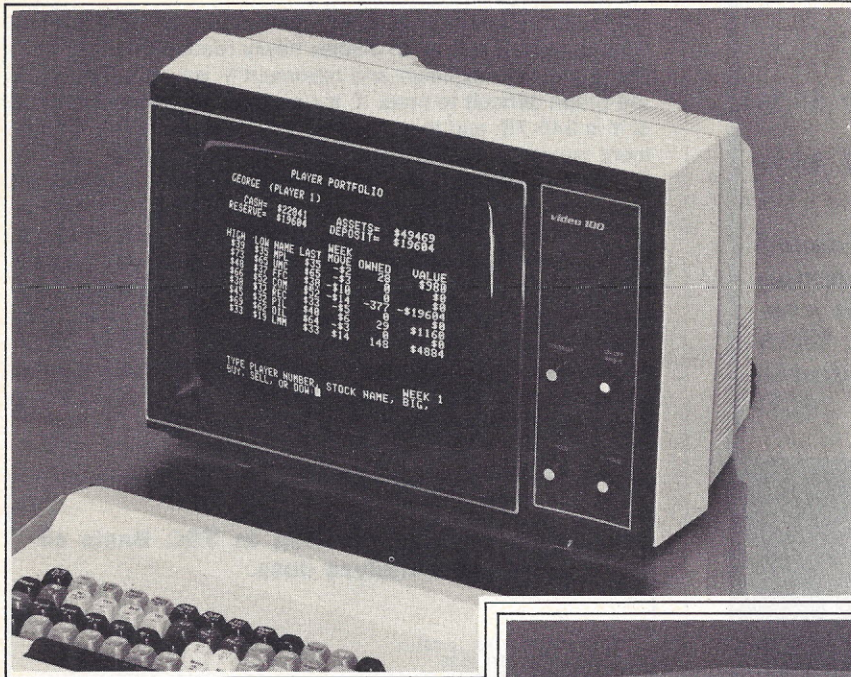
Figure 3 The program plots data in all four quadrants; also several points for a particular value of X.

indicates that a maximum of 60 X and Y pairs are allocated. The user can increase or decrease the 'dim' statement based on needs and memory resources. Also initialized by the 'dim' statement is the Z(10) array used by the plotting routine. It holds the values of Y to be printed for a particular value of X.

By the very nature of the output, the points on the graph are discrete. In other words, points are plotted to the nearest value on the graph. In figure 2, 1.2 cars are shown with an mpg

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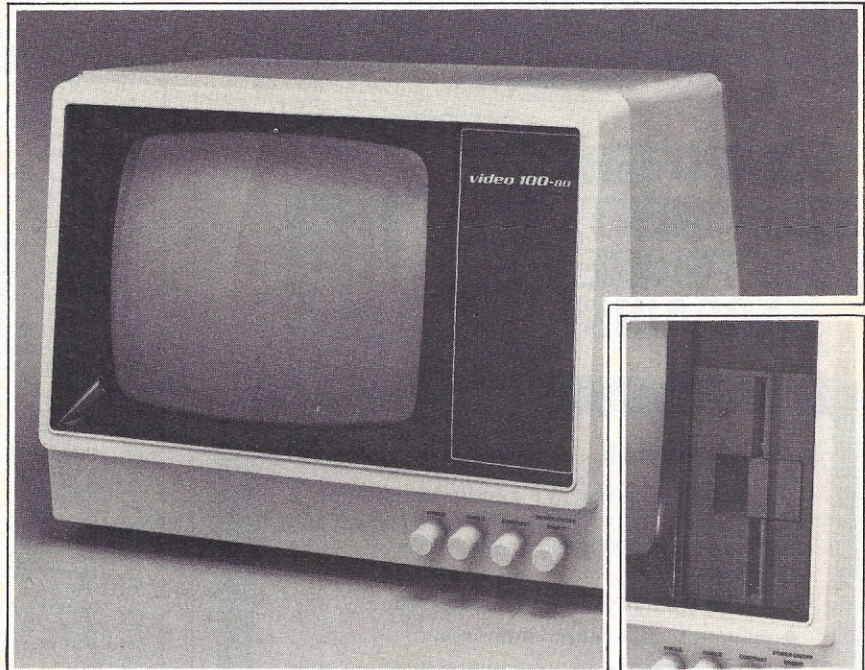
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rating of 3. Of course one cannot have 1.2 cars. However, 1.2 is the closest value to 1 (the actual value), therefore the point is printed at 1.2. All computer-generated graphs that use a standard terminal as output suffer from this slight inaccuracy. In cases where additional resolution is required, one can decrease both the X range and X increment. In this way, the Y axis will also have smaller increments thereby giving the increased resolution sought.

Obtaining legible values

Lastly, the minimum and maximum values of Y are manipulated in such a way as to display easily readable values on Y. Using the raw minimum and maximum Y values would make the graph difficult to read. If, for example, the minimum value of Y is 946.78, and the maximum value 12404.6, the Y increment would be 229.1564 $((12404.6 - 946.78)/50)$.

However, by reducing the lower limit of Y to two significant digits (see lines 850 to 960), and then modifying the maximum value of Y so it is evenly divisible by 50 (lines 970 to 1030), the lower and upper limits of Y become 940 and 15,940, respectively. This yields a graph with a Y increment of 300, which is far easier to read than the unmodified Y values. The reason for changing the range so it is evenly divisible by 50 stems from the fact that the graph is broken into 50 divisions. This does not include the 10 columns to the left of the graph that are provided for the X axis title and values. □

Complete program written in TSC Basic to plot points and analyze data.

```

10 DIM X(60),Y(60),Z(10)
20 ON ERROR GOTO 2570
30 REM *** LEAVE 10 SPACES FOR X AXIS LABEL AND SET FIRST INPUT TO 1
40 LO=10;N=1
50 INPUT "X AXIS PROMPT";XPS
60 INPUT "Y AXIS PROMPT";YPS
70 REM ***
80 REM ***
90 PRINT :PRINT "**** INSERT DATA MODE****"
100 PRINT XPS;"(";"N");"=;
110 INPUT XDS
120 IF LEFT$(XDS,1)="-" THEN 210
130 IF LEFT$(XDS,1)="-C" THEN 1930
140 IF LEFT$(XDS,1)="-T" THEN 530
150 IF LEFT$(XDS,1)="-D" THEN END
160 IF LEFT$(XDS,1)="-E" THEN 600
170 IF LEFT$(XDS,1)="-P" THEN 710
180 IF LEFT$(XDS,1)="-R" THEN 300
190 IF LEFT$(XDS,1)="-S" THEN 420
200 X(N)=VAL(XDS):GOTO 220
210 N=N+1
220 PRINT YPS;"(";"N");"=;
230 INPUT YDS
240 IF YDS="-" THEN 100
250 Y(N)=VAL(YDS)
260 N=N+1:GOTO 100
270 REM ***
280 REM ***
290 REM *** GET DATA FROM OLD DATA FILE
300 INPUT "NAME OF DATA FILE TO BE RETRIEVED";DRS
310 OPEN OLD DRS AS 1
320 REM *** READ NUMBER OF POINTS
330 INPUT #1,N
340 REM *** READ ALL X AND Y POINTS
350 FOR M=1 TO N
360 INPUT #1,X(M),Y(M)
370 NEXT M
380 N=N+1:CLOSE 1:GOTO 90
390 REM ***
400 REM ***
410 REM *** STORE DATA IN HISTORY DATA FILE
420 INPUT "NAME OF DATA FILE TO BE STORED";DSS
430 OPEN NEW DSS AS 1
440 REM *** STORE NUMBER OF POINTS
450 PRINT #1,N
460 REM *** STORE ALL X AND Y POINTS
470 FOR M=1 TO N
480 PRINT #1,X(M);",";Y(M)
490 NEXT M
500 CLOSE 1:GOTO 90
510 REM ***
520 REM ***
530 PRINT :PRINT "**** TABLE OF ELEMENTS****"
540 FOR M=1 TO N-1
550 PRINT XPS;"(";"M");"=;X(M),YPS;"(";"M");"=;Y(M)
560 NEXT M
570 GOTO 90
580 REM ***
590 REM ***

```



```

0060 IF ABS(M)>ABS(M+L3) GOTO 1100
0090 PRINT "Y AXIS AT X=";M;X4=M: GOTO 1110
1100 NEXT M
1110 REM *** COMPUTE SCALE FACTOR BASED ON MAX AND MIN Y
1120 K1=50/ABS(Y3-Y4)
1130 REM **** COMPUTE COLUMN OF X AXIS (K4)
1140 FOR M=Y3 TO Y4 STEP Y5
1150 REM ***** IF LOOPING IS ABOUT TO END, FORCE X AXIS TO LAST VALUE
1160 IF M > (Y4-Y5*.5) GOTO 1180
1170 IF ABS(M)>=ABS(M+Y5) GOTO 1200
1180 PRINT "X AXIS AT Y=";M
1190 K4=INT(ABS((M-Y3)*K1)+.5)+L0 : GOTO 1210
1200 NEXT M
1210 REM **** SET Y AXIS FLAG
1220 F=0
1230 REM ***** PRINT LABEL OF Y AXIS AND Y SCALE
1240 PRINT :PRINT :PRINT :PRINT TAB(20);Y5
1250 PRINT TAB(L0-3);Y3;
1260 PRINT TAB(L0+7);.2*(Y4-Y3)+Y3;
1270 PRINT TAB(L0+17);.4*(Y4-Y3)+Y3;
1280 PRINT TAB(L0+27);.6*(Y4-Y3)+Y3;
1290 PRINT TAB(L0+37);.8*(Y4-Y3)+Y3;
1300 PRINT TAB(L0+47);Y4
1310 REM **** PRINT Y AXIS LINE
1320 PRINT TAB(L0);"+-----+-----+-----+-----+"
1330 REM **** PRINT ALL POINTS THAT FALL INTO SPECIFIED X RANGE
1340 KO=0
1350 FOR M=L1 TO L2 STEPL3
1360 REM **** PRINT LABEL OF X AXIS
1370 F1=F1+1: PRINT MID$(X5,F1,1);TAB(2);M1;
1380 REM **** PRINT Y AXIS
1390 IF F=1 OR M1<>X4 GOTO 1500
1400 GOSUB 1640
1410 PRINT TAB(L0);
1420 FOR M=L0 TO (L0+50)
1430 IF KO>0 AND M=K3 THEN PRINT "" ; ELSE 1460
1440 GOSUB 1840
1450 GOTO 1480
1460 IF M=K4 THEN PRINT "I" ; GOTO 1480
1470 PRINT "-";
1480 NEXT M
1490 F=1: PRINT : GOTO 1620
1500 REM **** PRINT THE X AXIS POINT IF APPLICABLE (K4)
1510 REM **** PRINT THE DATA POINT IF APPLICABLE
1520 GOSUB 1640
1530 FOR M=L0 TO (L0+50)
1540 PRINT TAB(M);
1550 IF KO>0 AND M=K3 THEN PRINT "" ; ELSE 1580
1560 GOSUB 1840
1570 GOTO 1590

```

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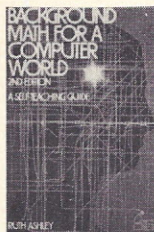
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```

1580 IF M=K4 THEN PRINT "I";: GOTO 1590
1590 IF M>K4 AND M>K3 GOTO 1610
1600 NEXT M
1610 PRINT
1620 NEXT M1
1630 GOTO 90
1640 REM **** THIS ROUTINE FINDS, COUNTS, STORES THE NUMBER OF
1650 REM **** Y VALUES FOR A GIVEN X. IF > 1 VALUE IS FOUND
1660 REM **** THE VALUES ARE SORTED
1670 FOR M=1 TO N-1
1680 IF X(M)>X(M+L3/2) AND X(M)<X(M+L3/2) THEN K0=K0+1 ELSE 1700
1690 Z(K0)=X(M)
1700 NEXT M
1710 IF K0<2 THEN 1820
1720 REM **** SORT ROUTINE
1730 K5=0
1740 FOR M=K0 TO 2 STEP -1
1750 IF Z(M) <= Z(M-1) THEN 1800
1760 Z1=Z(M)
1770 Z(M)=Z(M-1)
1780 Z(M-1)=Z1
1790 K5=1
1800 NEXT M
1810 IF K5=1 THEN 1730
1820 K3=INT((Z(K0)-Y3)*K1+.5)+L0
1830 RETURN
1840 REM **** PREPARE FOR NEXT POINT TO BE PRINTED
1850 K0 = K0-1
1860 IF K0 = 0 THEN RETURN
1870 REM **** SKIP TO NEXT Y VALUE IF Y VALUE ARE IDENTICAL
1880 IF Z(K0)=Z(K0+1) GOTO 1850
1890 K3 = INT((Z(K0)-Y3)*K1+.5)+L0
1900 RETURN
1910 REM ****
1920 REM ****
1930 PRINT :PRINT :PRINT "**** CALCULATE STATISTICS MODE ****"
1940 INPUT "WHAT DATA GROUP (X OR Y)";D$
1950 IF D$="X" GOTO 2270
1960 REM **** DATA GROUP IS Y IGNORE X DATA
1970 PRINT "DATA GROUP IS ";Y$;
1980 PRINT " THEREFORE ";X$; " WILL NOT BE USED."
1990 REM **** FIND MIN (Y3) AND MAX (Y4)
2000 Y3=1E10 : Y4=-1E10
2010 FOR M=1 TO N-1
2020 IF Y(M)>Y4 THEN Y4=Y(M)
2030 IF Y(M)<Y3 THEN Y3=Y(M)
2040 NEXT M
2050 PRINT "LOW ";Y$;"=";Y3
2060 PRINT "HIGH ";Y$;"=";Y4
2070 PRINT "RANGE =" ;Y4-Y3
2080 REM **** CALCULATE MEAN
2090 SY=0
2100 FOR M=1 TO N-1
2110 SY=SY+Y(M)
2120 NEXT M
2130 PRINT "SUM OF ";Y$;"=";SY
2140 MY=SY/(N-1)
2150 PRINT "MEAN =" ;MY
2160 REM **** CALCULATE VARIANCE
2170 V=0
2180 FOR M=1 TO N-1
2190 V=V+Y(M)*Y(M)
2200 NEXT M
2210 VY=(V-(N-1)*MY*MY)/(N-2)
2220 PRINT "VARIANCE =" ;VY
2230 PRINT "STANDARD DEVIATION =" ;SQR(VY)
2240 GOTO 90
2250 REM ****
2260 REM ****
2270 REM **** FREQUENCY DISTRIBUTION
2280 PRINT "FOLLOWING STATISTICS REPRESENT FREQUENCY DISTRIBUTION "
2290 PRINT "Y AXIS VARIABLE WILL BE USED AS THE FREQUENCY"
2300 REM **** FIND MIN (X3) AND MAX (X4)
2310 X3=1E10 : X4=-1E10
2320 FOR M=1 TO N-1
2330 IF X(M)>X4 THEN X4=X(M)
2340 IF X(M)<X3 THEN X3=X(M)
2350 NEXT M
2360 PRINT "LOW ";X$;"=";X3
2370 PRINT "HIGH ";X$;"=";X4
2380 PRINT "RANGE =" ;X4-X3
2390 REM **** CALCULATE MEAN
2400 SX=0 : SY=0
2410 FOR M=1 TO N-1
2420 SY=SY+Y(M)
2430 SX=SX+X(M)*Y(M)
2440 NEXT M
2450 PRINT "SUM OF ";Y$;"=";SY
2460 MX=SX/SY
2470 PRINT "MEAN =" ;MX
2480 REM **** CALCULATE X VARIANCE
2490 V=0
2500 FOR M=1 TO N-1
2510 V=V+Y(M)*X(M)*X(M)
2520 NEXT M
2530 VX=(V-SY*MX*MX)/(SY-1)
2540 PRINT "VARIANCE =" ;VX
2550 PRINT "STANDARD DEVIATION =" ;SQR(VX)
2560 GOTO 90
2570 REM **** FLEX DISK ERROR MESSAGES
2580 IF ERR=7 GOTO 2620
2590 IF ERR<>4 THEN ON ERROR GOTO 0
2600 PRINT "THE FILE COULD NOT BE FOUND"
2610 GOTO 2630
2620 PRINT "ALL DISK SPACE HAS BEEN USED"
2630 CLOSE 1
2640 RESUME 90

```


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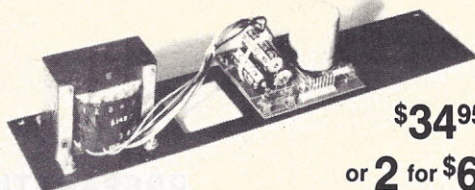
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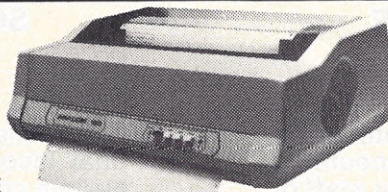
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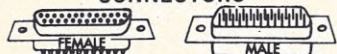
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CND-DB50C	50 PIN COVER	\$ 2.00	\$ 1.80	\$ 1.60
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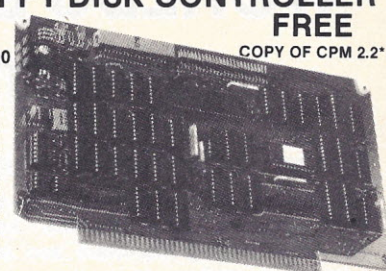


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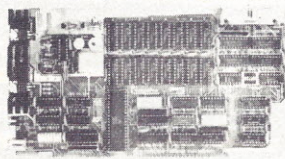
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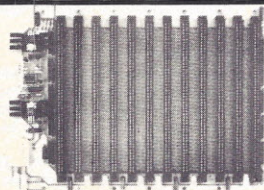
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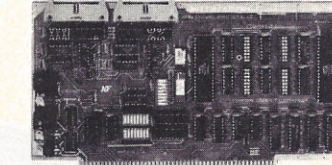
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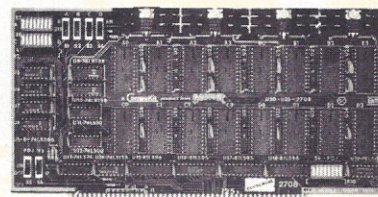
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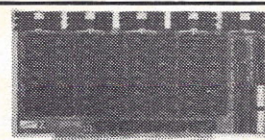
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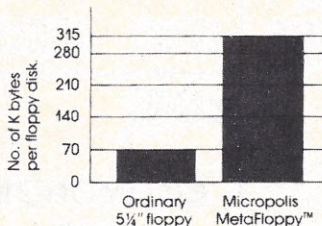
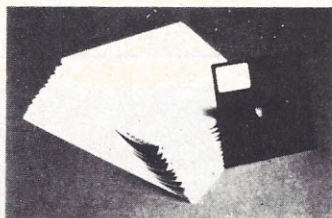
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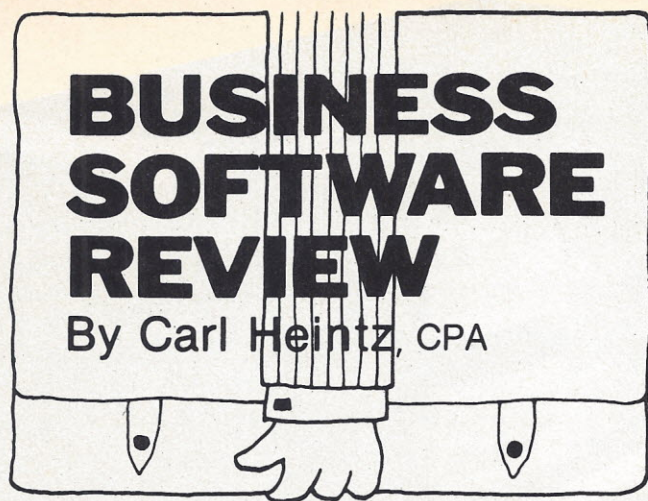
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"Pearl"—A Novel Programming Gem

A unique set of programs from Computer Pathways in Oregon (2151 Davcor SE, Salem, OR 97302) called Pearl is outstanding for the user who wants to write custom applications programs with a minimum of time, errors and frustration.

Pearl stands for "producing error-free automatic rapid logic"—an apt description for these program generators. For clarification, just what is a "program generator"? Let's assume that a user has an application he wants to program. Basically, the user can have it contracted out to a programmer, buy a prewritten program, or write it himself. Assuming the latter, the user is faced with the prospect of writing code in the language of his choice, debugging it, running it, debugging, etc., until the program runs correctly.

Realistically, depending on the complexity of the program, the process can take months. Professional programmers and systems houses long ago found that, even though applications specifications vary, there are certain elements to the programming process common to almost every application. Accordingly, with a little ingenuity, it is possible to write a program which will translate the user's requirements into a program which accomplishes those needs.

In other words, we start with a broad outline of a program and, with the computer's help, user-customize it. The computer modifies the "seed" program using input from the user. That's a gross simplification, but it conveys the general idea of Pearl. A program generator is an uncommon product amongst micro software, probably due in part to the sophistication required of a good one. Pearl is very sophisticated, which makes it easy to use, reliable and efficient. The first thing the user will be impressed with is the manual—it's comprehensive with over 150 pages explaining what the program does and how to effectively use it.

Assuming the user to be a non-programmer, he can use Pearl to:

1. Produce simple data entry, edit and reporting systems.
2. Prompt the user to consider different aspects of design that can affect the efficiency and effectiveness of the applications program.
3. Present a model program which can be easily modified when necessary (many professional programmers pull out their hair over novice-generated faulty programs).

If the user is a programmer, then Pearl adds the following capabilities:

4. Provides a standardized model for constructing the system.
5. Eliminates the need to invent file, input/output structures, and tedious routines to edit data.
6. Saves time by providing model programming standards, and eliminates reinventing the wheel.

7. Eliminates, to a large degree, the useless and frustrating "grunt" work involved in debugging.

To implement Pearl takes at least 48K running CP/M with C-Basic-2, version 2.03 or later, with the command 'crun2'. Additionally, the system may require Structures Systems' Qsort program. Pearl comes in three levels, depending upon the level of complexity required by an application program. Level I is the simplest version of Pearl, and is intended for the layman. Suggested applications include writing programs to calculate interest, home management, etc. The programs will not support writing games such as "Startrek."

Pearl level II is designed to develop simple systems or portions of larger systems. Its applications could include a mailing list system, a sales lead system, or simple accounting system.

The true gem amongst the Pearl programs is level III. This is designed to accommodate almost any type of standard business problem including:

- a. Define and cross-index data elements between files.
- b. Define and generate reports from multiple files.
- c. Post journals and define interrelationships between files.

The beginning point for Pearl is the setup of working disks. This process is a bit time-consuming the first time through—I suspect partially due to the anticipation of getting the system running. The process is fairly easy, however, assuming that the user has some familiarity with CP/M. Generally, the user will have to generate at least three applications disks, each with different programs.

Once the program is set up, the manual devotes a considerable amount of space (40 pages) to an example of an application. The layout is useful to a novice as a structure by which to define a new program—and as a framework within which to grasp what Pearl is all about.

Guidance for the first-time user

The chapter in the manual that helps the novice user most is *Detailed Explanation of Application Generation*. Numerous options are offered on how to set up an application, including: indexed or random file access, storage format (floating point, integer, string, etc.), ranges for variables, and editing. As to editing, the system will edit with respect to ranges of values, Y or N, alpha only, or array validation. Array validation, for example, can be a powerful method of determining that only specified responses are accepted.

The manual explains each of the options in nontechnical terms. A first-time user will have no difficulty understanding how to implement a program.

For programmers, there is a chapter that goes into a lot more detail about what is going on inside Pearl. The novice user can ignore this.

To use Pearl, the user simply responds to a series of questions about what the program is to do, what kinds of input it will receive, and what the output should look like. The interaction is speeded up considerably if some time is spent going over the example in the manual on prethinking out the options ahead of the computer input session.

How fast is Pearl? Benchmarking a program generator is next to impossible since there are so few comparisons. In this case, I spent 6 hours generating my first program, having jumped right in without, of course, reading the directions. My program was a simple time-accounting system. A similar job, done "by hand" line-by-line of code, took in excess of 25 hours. While my experience may not be representative, I can attest to the joy of having the program run the first time through, all with no syntax errors. That alone was worth its cost.

As to cost, Pearl is reasonable: level I is \$130, level II is \$350. The deluxe version is \$650. At these prices, just one or two projects can repay its entire cost. Any disadvantages? I couldn't find any. I suppose there are bugs, but none came to my attention. For a commercially available program, Pearl is a true gem. □

The TRS-80 Color Computer

by Al Baker



Radio Shack has announced not one, but three new computers. All three are notable, but the one that excites me the most is the TRS-80 Color Computer.

The first thing worth knowing about the TRS-80 Color Computer is its price. At \$400, it is two-thirds the price of its nearest competitor. For this you get a computer with color graphics, sound, 4K of memory and an 8K floating point Microsoft Basic. A color or B/W tv, cassette recorder, and two joysticks can be added.

One of the sharper features of the computer is the cartridge slot. Radio Shack sells plug-in ROM cartridges for entertainment, education, and financial management. These plug in and instantly convert the computer into a special purpose tool for the homeowner.

Also included is an RS232C interface. This lets the system communicate via a modem and phone lines with the new information utilities or with other personal computers. This also makes it possible for the computer to directly communicate with a universe of RS232C-compatible devices such as printers and plotters.

Another feature is available only to the machine language programmer. The unit provides two built-in clocks. The low-speed clock is driven by the 60-cycle vertical synch controlling the tv set and the high-speed clock is driven by the horizontal synch. These two clocks can be set to provide interrupts used by machine language programs as timers.

What you don't get for your \$400 is surprisingly short. You must supply your own tv or buy one. Radio Shack will be happy to sell you a tv styled for the computer. Another extra is the cassette recorder. Almost any brand works well, but Radio Shack recommends its own.

I can understand selling the tv and cassette recorder as extras. Many or most potential buyers have one or both. Several other items are lacking which should have come with the computer. Larger user programs won't fit in 4K. Also, some of the cartridges work better or provide additional functions if more memory is available. The computer should have come with additional memory. As it is, I recommend that you pay the extra money for the 16K version.

Use a joystick

I also recommend that you get the joysticks. These are one of its nicer features. They are dual-proportional, and the computer can tell to within 3° which direction the joystick has been pushed, as well as how far. You can exactly simulate an airplane's control stick. The farther forward the joystick is pushed, the steeper the airplane dives. The farther to the side it is pushed, the sharper the airplane banks.

There is one problem; the joysticks do not self-center. When released, they do not return to an upright position. Since some people consider this a benefit, I won't argue the point strongly.

The last item missing from the system is a full extended Microsoft Basic. Radio Shack has announced an extended Basic, but I would have thought it learned its lesson from the original TRS-80's level I and level II. This will again create the need for two different universes of support: those supporting 8K Basic and possibly Extended Basic, and those supporting Extended Basic only. My guess is that Microsoft was unable to

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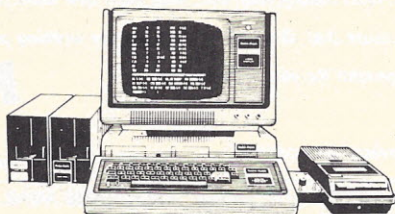
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provide the full Basic in time for the computer announcement. Considering the expense of supporting two language environments on one computer, the reason cannot have been cost.

Music and sound effects are created through the tv speaker. If you get tired of the noise, you can stop the sound by turning off the speaker. Basic programs can generate tones through the Basic sound keyword. More complex sounds require the user to write his own machine language routines. To produce a sound in machine language, the programmer has access to either a 6-bit digital-to-analog converter or a single-bit speaker toggle.

Ten distinct display modes are available. The only mode directly useable by a Basic program is the alpha-numeric/semigraphics display. In this mode, the screen is divided into 16 lines of 32 characters each. Among the 64 different characters available are the upper-case letters, numbers, and special symbols such as !''#\$%. These can be displayed as black on light green, light green on dark green, or black on orange.

Also available in this mode are low resolution graphics. This works in a manner similar to the original TRS-80 model I. Each character position can be broken up into a 2 x 2 graphics box. This provides 64 pixels, or points, across by 32 down. Each pixel can be one of eight colors or black. An advantage of this display mode is that text and graphics can be mixed on the screen.

Graphics mode limitations

The other graphics modes do not allow for text on the screen, and some of them require more memory than is available on a 4K computer. They are also unavailable to the Basic programmer. Machine language user routines must be written to access them.

The highest color graphics mode requires 6K of memory and provides four colors on a 128 x 192 pixel screen. The highest uncolored graphics mode provides 256 x 192 pixels on the screen and also uses 6K of memory. One of the advantages of the color graphics system is that the machine language programmer can keep more than one graphics screen around and switch between them.

The computer is also a programmer's computer. The microprocessor running the show is Motorola's 6809 MPU. The Basic is clean and very fast. And if you get tired of programming in Basic, you can program in machine language.

Although no mention has been made of hardware add-ons, the system is expandable. The published memory map implies that RAM memory is almost certainly expandable to 32K. Likewise, the cartridge slot provides CPU bus expansion. An expansion box similar to the one for the model I is possible. I suspect that if Radio Shack doesn't announce one, someone else will. This could support floppy or hard disks and parallel printers. Considering where the industry is going, I wouldn't be surprised if someone hooked a video tape or video disk to the system.

The computer Basic was written by Microsoft. It is excellent. Most of its drawbacks are probably due to the cramped room available in 8K. I hope these problems will be fixed in the expanded version. Among its many features are:

- Full floating point math; the numeric range is from 1E-38 to 1E38.

NOVEMBER 1980

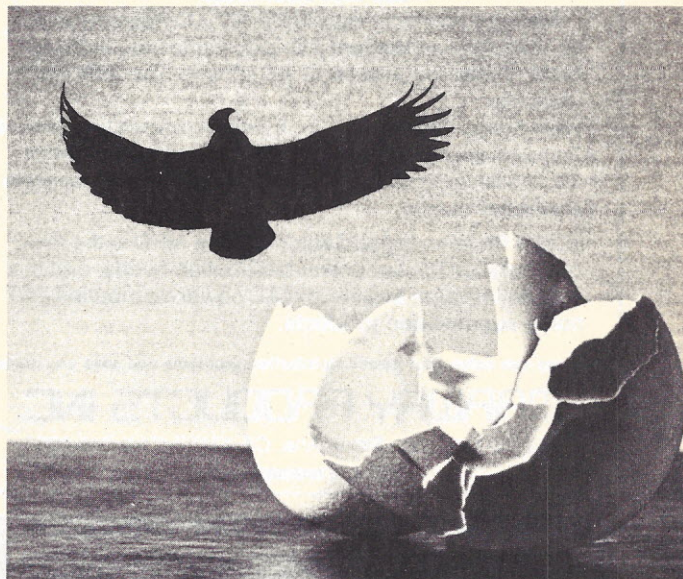
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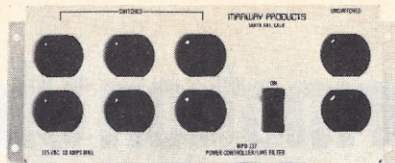
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- 'Motor on' and 'motor off' commands control the remote switch on the tape recorder. This is a lesson learned from the model I.
- 'Audio on' and 'audio off' let you listen to the tape while the program is loading.
- The tape system is fast and reliable. This is another lesson learned from the model I. Basic will tell you if the program has loaded incorrectly.
- Machine language routines are supported with the 'usr', 'peek', and 'poke' keywords.
- 'CloadM' will load a machine language that can run with the 'exec' command.
- Tones and music can be created using the 'sound' keyword.
- The 'joystk' function can be used to read the joysticks.
- The 'set' keyword can be used to turn on a low resolution pixel on the tv screen and set it to a particular color. The 'reset' turns off a pixel and the 'point' keyword can be used to determine the color of a pixel.

Minus customary features

Many of the features one has come to expect from Microsoft Basic are missing. Many important features required of a good color and sound are also missing. Among these missing features are:

- No easy way to create sound effects. The 'sound' verb makes only pleasant tones: no explosions, gun shots, laser zaps, or the like.
- No true graphics commands such as 'line', 'box', 'draw' a shape, 'circle', 'put' shape on screen, 'get' shape from screen, or 'create' a shape.
- There is no way to get at the high resolution modes. At sufficiently high modes, Basic should support text generated as shapes. This should include both upper- and lower-case letters as well as a large letter set for children.
- Integer and double-precision arithmetic are not available.
- The 'deffnx' keyword isn't provided.
- It is not possible to get the address of a variable with the 'varptr' keyword.
- 'Print using' isn't supported.
- Tracing and 'on error' are not available.
- Except for 'sin', there are no logarithmic or trigonometric functions.
- The ability to edit a line of the program is not supported. Yep, there is no line editor. (I would suggest that the people at Microsoft take a close look at the Atari screen editor before doing their next one.)

Should you buy this computer? It depends too much on your needs. It is probably the wrong choice for a businessman. It could very well be the right choice for your home.

Friends of mine, with limited budgets, have been craving an inexpensive, but good, game-playing programmable computer. For the last year, I've told them to wait. I've stopped. For the first time there is a good, fully programmable and expandable computer with an excellent Basic, sound, color, and graphics for substantially under \$500. □

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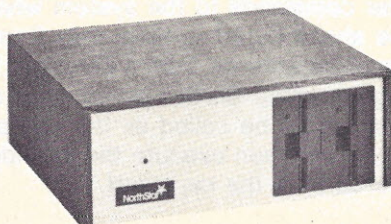
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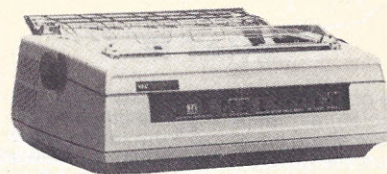
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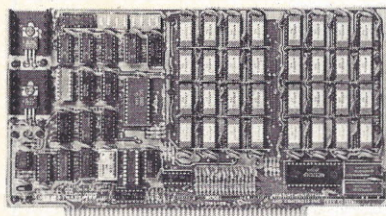
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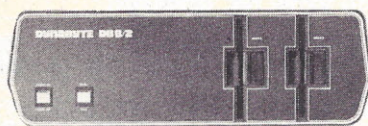


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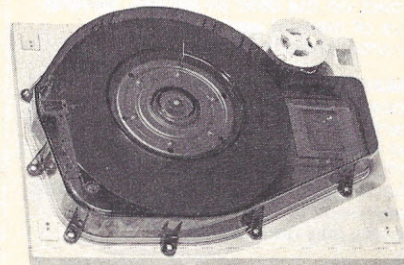
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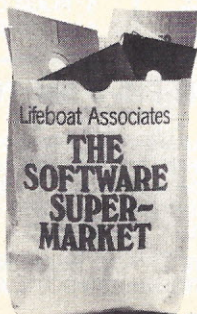
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A Reader's Comment

Your article Beating the System by Mark J. Borgerson (Sep 80) describes a very difficult way of doing something that is actually much simpler. The Apple Pascal system contains a type ahead buffer which allows the user to enter commands to the system while a program is running. Normally, this type ahead buffer is filled only from the keyboard, so system commands cannot be entered from a program. I have enclosed an assembly language program which fills this buffer when called from a Pascal program. This program should be called as the last statement of the Pascal program. The system will then execute the intended commands just as if they had been entered from the keyboard.

William W. Basham
Rockford, IL 61111

```

;CHAIN ROUTINE FOR APPLE PASCAL
;
;DEFINE IN PASCAL PROGRAM AS FOLLOWS
;
;  PROCEDURE CHAIN(S:STRING);
;  EXTERNAL;
;
;PARAMETER STRING WILL BE TRANSFERRED TO PASCAL
;TYPE AHEAD BUFFER. THIS WILL BE USED BY THE
;SYSTEM FOLLOWING TERMINATION OF THE CALLING
;PROGRAM JUST AS IF THE STRING HAD BEEN TYPED
;IN FROM THE KEYBOARD
;
;THE CARAT CHARACTER "^" IS CONVERTED TO A
;CARRIAGE RETURN BY THE PROGRAM
;
;EXAMPLE: CHAIN('PROGRAM2');
; WILL CAUSE THE SYSTEM TO EXECUTE A PROGRAM
; NAMED 'PROGRAM2' FOLLOWING TERMINATION OF
; THE CALLING PROGRAM
;
RETURN .EQU 0           ;STORAGE FOR RETURN ADDRESS
BASKL .EQU 2            ;STORES ADDRESS OF STRING
BASH .EQU 3             ;FROM CALLING PROGRAM
PREAD .EQU 0BF18        ;BUFFER READ POINTER ADDRESS
PWRITE .EQU 0BF19       ;BUFFER WRITE POINTER ADDRESS
BUFFER .EQU 3B1         ;ADDRESS OF PASCAL TYPE AHEAD BUFFER

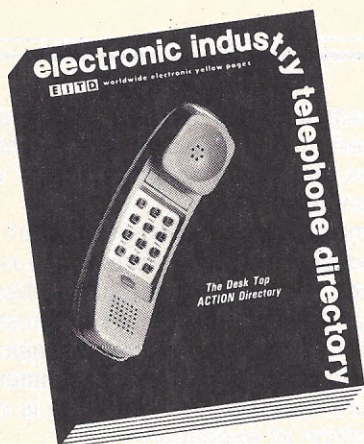
;PROC CHAIN,1
PLA                     ;SAVE RETURN ADDRESS
STA RETURN
PLA
STA RETURN+1
PLA
STA BASKL              ;GET ADDRESS OF STRING PARAMETER
PLA
STA BASH
LDY #0                 ;SET READ POINTER TO 0 (FLUSHES BUFFER)
STY PREAD
LDA @BASKL,Y           ;GET LENGTH OF STRING
STA PWRITE             ;SET WRITE POINTER TO LENGTH OF STRING
TAY
#10 LDA @BASKL,Y       ;GET CHARACTER FROM STRING
CMP #SE                ;CHECK FOR ^ CHARACTER
BNE $20
LDA #00                ;CHANGE ^ TO <RETURN>
#20 STA BUFFER,Y       ;STORE IN TYPE AHEAD BUFFER
DEY
BNE #10
LDA RETURN+1           ;RESTORE RETURN ADDRESS
PHA
LDA RETURN
PHA
RTS
.END

```




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Getting Started with Pascal

by Daniel S. Hunt

If you plan to experiment with Pascal, several low-cost versions of the language are available for popular mini-floppy systems. These include implementations for TRS-80, Apple and North Star compatible machines.

There is one hitch. Most tutorial books and reference manuals assume prior knowledge of the language. Or they don't present the mundane but necessary program examples that show how to clear screens, skip lines, or divert output to either the CRT or the printer without having to write duplicate code—a potential time-waster for the beginner.

Pascal is actually easier to write at its most fundamental level than the documentation would lead you to believe. As Pascal was intended as a teaching language, the manual writers seem to have things backwards.

Assume that you are familiar with Basic. We'll draw practical parallels with Basic, and bypass the theory of Pascal. The idea is to get you writing simple lines of Pascal code as quickly as possible. Purists may object that equating Pascal to equivalent statements in Basic is not the proper way to teach Pascal. My reply is "learning is doing." The faster you start doing something and make your own honest mistakes, the faster you can learn.

In practical terms, the process of writing, compiling and executing a program is similar to a session with a CBasic compiler, with the extra step of linking code from the library. Summarizing: you write, compile, link and execute the program.

There are some differences. Even in a micro-computer not tailored for it, Pascal will execute 2 to 10 times faster than most Basics; it is midway between pure machine language and an interpreter. Pascal has its own elegant operating system called 'system.filer' to manage the transfer of files, peripheral interface and other housekeeping chores. While the Pascal system will not be compatible with a disk operating system, most versions offer assemblers to allow advanced programmers to interface machine language routines with the Pascal programs.

As system operation is fairly well documented in most manuals, we'll move on to the language.

Structural differences from Basic

Pascal programs have structural counterparts (if not exact equivalents) in Basic. Both have main programs and subprograms. Subprograms in Basic are called subroutines. In Pascal, they are called procedures.

Basic allows the distinction between main program and subroutine to become hazy, while Pascal demands a more formal distinction between program and procedure. The Pascal compiler "punishes" the programmer for bad structure and poor management of variables by refusing to compile, or refusing to communicate values properly between the main program and the subprograms. Conversely, all variables in a Basic main program and its subroutines are in com-

munication with one another, so the type of punishment is different: the Basic program runs tolerantly, but punishes the careless programmer with hidden error and confusion.

Basic is improvisatory. You simply start coding, not having announced to the interpreter the nature of the variables used or the data structure. Need a string variable? Grab A\$ and plug it in. Program structure, for the most part, is in the player's mind. Basic's excellent control mechanisms allow a programmer to create good structure, but the good structure is not demanded as a condition of execution.

Pascal demands forethought

Pascal is intolerant of improvisation. It wants a solid, well-defined opening in the manner of Beethoven's Fifth Symphony. It wants to know in advance how you will use variables and how you plan to structure data in arrays, records or even sets. Pascal requires a study of Pascal theory. If you haven't time, it is possible to emulate Basic in Pascal and function effectively.

Consider the use of variables in listing 3, Program Numberfix. Numberfix emulates the function of a Basic interpreter. If you accidentally enter a character when an 'input' statement calls for a floating point number, the interpreter tells you to start again.

The variables A, 'realnum', 'numstr', 'errors', and 'correct' are declared by type in the main program. Hence they will be recognized by all parts of the program, including the procedures; in effect, they are universal. But the variables I, N, and 'letter' which are declared in Procedure Getnchk will be recognized only within that procedure; in other words, they are local. Before you use any variable, it must be declared or the program won't run.

Refer to Program Pocketcalc in listing 1; it imitates a calculator that adds, subtracts, multiplies, or divides two floating point numbers. For our purposes, it serves to illustrate the use of a subroutine-type procedure call, the use of simple operators and input/output keywords, and a few attractive, unusual features of the Pascal system.

Each statement is separated by a semicolon, with the notable exception of block control statements such as 'begin', or loop control phrases such as 'while <expression> do'. This is to be contrasted with Basic, in which a statement is separated from the others by moving to a new line.

In Pascal, moving to a new line does not end the statement, nor are there line numbers in Pascal. In the event a 'goto' must be used, the target statement is preceded by a number; that number is a label (such as in Fortran of Cbasic) rather than a line number.

The UCSD Pascal compiler ignores statements used for commentary when these statements are enclosed

either in meta-brackets, { remark }, or with parentheses adjacent to an asterisk, (* remark *). Because Pascal is a compiled language, there is no reason to skimp on comments; they occupy no space in the executable code.

Variables and constants may appear together in input/output statements or declarations, separated by commas. The commas do not control line feeds or spacing as in Basic. For example in Program Pocketcalc, variables A, B and C are declared to be real numbers as a group. They are separated by commas. An output string that accompanies one or more variables being output may also be separated for the variable by a comma.

```
WRITELN ('The result equals:', C);
```

Several statements may appear on the same line, but must be separated by a semicolon. There is no space saving for putting more than one statement on a line, so use multi-statement lines for clarity, not compactness. In listing 1, 'Writeln' ('Do it again?'); and the input statement 'read' (yesno) are so combined.

Looking at Program Pocketcalc, you may have deduced the manner in which it can be duplicated in Basic. However, there are a few tricky things about Pascal syntax with respect to both usage of variables and operators.

Lowercase makes a difference

With respect to variables, an important point to remember is that they can be one or more characters in length. 'A' is a variable, and 'yesno' is a variable. As the Pascal compiler recognizes both upper and lower case, 'YESNO' is not the same variable as 'Yesno'. Thus, if you answer with a lowercase 'n' in the question, Do you wish to calculate 2 numbers?, Pocketcalc will appear to malfunction and keep on calculating.

You cannot determine the type of a Pascal variable by looking at it out of context. Basic offers variable A usually as a default real number of single or double precision, and A\$ as an easily recognizable string variable. To find the nature of A in Pascal, look at the second and third lines of Pocketcalc. Variable A has been declared real (a floating point number with 7.2 digits of precision in version 1.5). If it was to be used to accept a string value, the declaration would be 'char', or a special UCSD data type called 'string'. 'A' could also be declared as integer or Boolean (logical true or false).

Pascal does not tolerate expressions which mix integer and real numbers, in contrast to Basic (or even Fortran) where integers can mix with real numbers—sometimes disastrously.

Pascal operators are essentially like those of Basic, with one troublesome exception. There are two kinds of equal signs. The one Basic programmers know is =. In Pascal, it may be used only for logical comparison of two values. To assign a value to a variable, Pascal requires that a colon precede the equal sign, as in :=. Line 15 of Pocketcalc uses both forms in the familiar 'if-then' construction.

```
IF OPERATOR = '+' {check for equivalent value}  
THEN C := A + B; {assign the value of A + B to C}
```

The 'write', 'writeln', 'read' and 'readln' statements in Pocketcalc have close correspondence with the 'print' and 'input' statements of Basic. The subtleties are as follows:

Both 'write' and 'read' statements are followed by parentheses in which the destination or origin of the

data to be written or read is specified, followed by a comma, followed by quoted strings and/or variables in any order, as in:

```
WRITE(OUTPUT, 'The height is', A, ' and weight is', B);
```

In standard Pascal, the word 'output' is required to send output to the CRT. In UCSD Pascal, 'output' may be omitted if the CRT is desired as the default destination. If the 'write' is destined for a file, a previously declared file name would replace the 'output'. The same pattern obtains with the use of standard Pascal's 'input', which may be omitted in UCSD Pascal if it is intended to get input from the console.

If 'write' is used, subsequent output will pick up at the end of the original line that was output. Microsoft Basic or CBasic uses the semicolon to suppress the line feed, as in:

```
PRINT "The height is";A;"and weight is";B;
```

In Pascal, 'writeln' is used to obtain a line feed and carriage return at the end of the output line. Subsequent output occurs on a new line. 'Writeln' is also desirable to use when writing character representations of real numbers to text files. Among other things, it will prevent the appendage of spurious digits if the file is read back as a real number. An example of this usage occurs in Procedure Convert of listing 3:

```
WRITELN(F, NUMSTR);
```

'Read' and 'readln' also offer important practical differences. 'Readln' is used if it is desired to input a string of values into a variable of type 'char', for example. Input continues until receipt of a carriage return. Likewise, 'readln' may be used to input an 'integer' or real number one or more digits long.

'Read', on the other hand, does not require a carriage return to allow the program to continue. It wants only a single keystroke. It is equivalent to an 'inkey\$' sequence in Microsoft Basic, 'inchar\$' in North Star Basic, or the 'conchar%' function of CBasic. In the Microsoft version we would write:

```
100 X$ = INKEY$  
110 IF X$ <> "" THEN 120 ELSE 110  
120 REM...Program loops until X$ is not equal to null.
```

In Pascal we have only to write:

```
READ(INPUT,A)  
(*Program stays here until keystroke is received*)
```

Cleaning up the screen

Another remarkable characteristic of Pascal I/O is demonstrated in Program Pocketcalc in the line which simultaneously asks for the value of A, the 'operator', and value B. Since the real numbers A and B are separated by the variable, 'operator', which is of type 'char', no carriage return or comma must be entered to separate the values. The user simply types in the expression as it appears in the program.

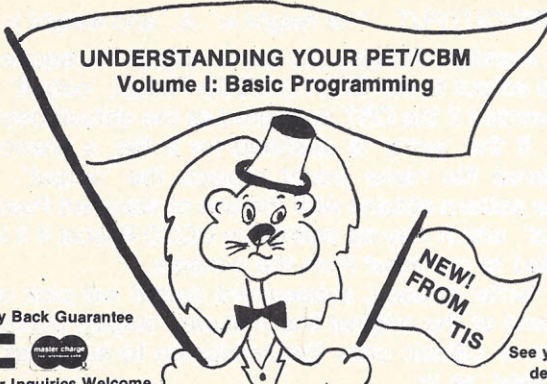
It is desirable to "clean up" the screen or space lines at times. The job in Pascal is the exact parallel of Basic. Thus 'print chr\$(11)' in Basic is duplicated by 'write(chr(11));' in Pascal. It clears the screen.

```
PRINT: PRINT in Basic is
```

```
WRITELN; WRITELN; in Pascal. It skips two lines here.
```

Pascal offers two simple formatting devices to control the layout of printed data. These consist of a field length specification, as well as a spec for controlling the number of digits to the right of the decimal point.

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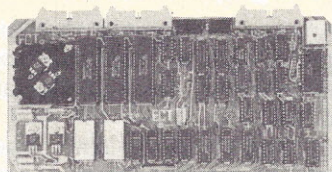
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Without field and decimal specification, real numbers default to scientific notation.

An output statement for producing a field a maximum of 10 characters long, with two digits to the right of the decimal, would take the form of:

```
WRITELN(OUTPUT, 'The answer is', C:10:2);
```

The value of variable C will be set at the right end of the field. Note that a floating point real number is assumed here. Fielding an integer with a decimal specifier would result in type error. If C in the above example was integer, the 2 would have to be omitted.

Character and string variables may also be fielded merely by omitting the decimal specifier, as in:

```
A := 'GEORGE';
```

```
WRITELN(OUTPUT, A:10);
```

George will also be set to the right of the field.

Pascal format control is simple, but business programmers will find it the weakest part of the language. It runs afoul of implementations that, do not allow the use of integer values higher than 32,767. While Pascal allows you to round or truncate real values to integer, the function works only with values less than 32,767. Hence if you wish to drop decimal points from real numbers to produce tidy output, a special conversion procedure must be written to handle real numbers above the maximum integer capability of your machine. Look for a system that offers the 'longinteger' facility of Pascal if this is important to you.

How do you get output to the printer? And, can you choose between outputting to the printer and the CRT without having to write duplicate code? This last question is an important one for the laborious programming of statistical and commercial spread sheets. CBasic and North Star Basic offer printer/CRT switch statements to eliminate the writing of separate video and line printer output procedures. Microsoft Basic, using 'print' and 'lprint' does not, so the user must intervene with machine language or decompose the printing algorithm into looping microroutines fed by 'if-then-else' branches to minimize dupe code.

Happily, Pascal offers an excellent solution, though the manuals do their best to hide it. The first clue is that Pascal treats all peripherals as text files. The Pascal 'system.filer' has an official name for your printer called 'printer:'. Your CRT/keyboard may be treated as 'console:', as an alternative to the interactive default for input, output. Note the important use of the colon at the end of the peripheral name.

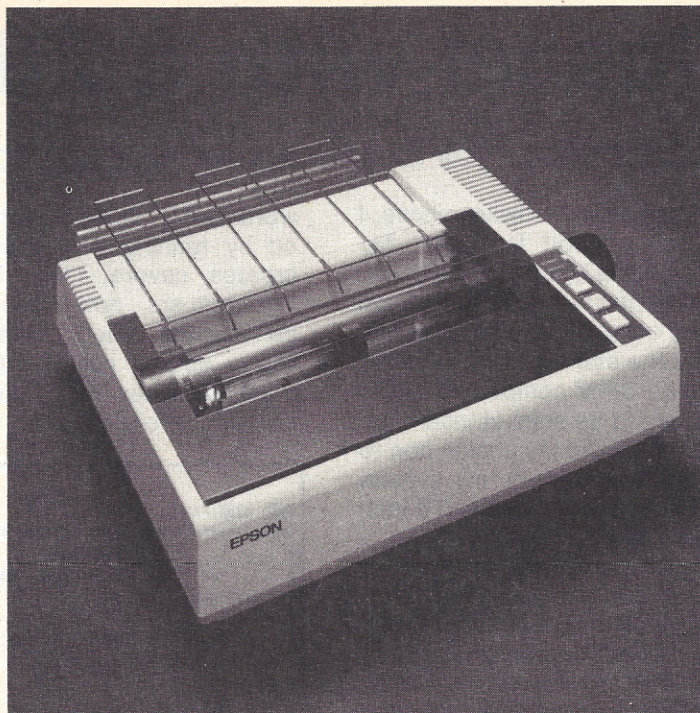
Borrowing from the logic of the filer, to write a file called 'printer:', we must declare a file F of type text at the beginning of the main program or in the printing procedure. To output to the printer, we assign the name 'printer:' to a string variable, 'filename', then open the file so named, write to the file, and close it. If instead, we desire to write to the console, the name 'console:' is assigned to the string variable instead of 'printer:'.

The execution of this algorithm is illustrated in listing 2, a program for calculating standard error and its relative impact on a research sample at 99, 95, 90, and 69 percent levels of confidence.

Rather than poke comments at Program Conflimit's relatively complex listing from the main body of this article, considerations of readability have led me to comment the germane points from within the listing itself. □

Program on Page 138

If you
just bought
another
printer,
boy are
you gonna
be sorry.



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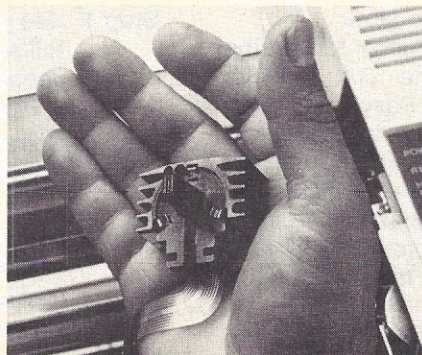
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Pascal with a Z80

by Charlie Foster

Once beyond my microcomputer hardware phase, I naturally looked around for a good language. My system could handle most anything since it was a S-100 Z80 with dual double-sided floppies. The first decision was that it had to be upward compatible. The DOS was CP/M 2.0, so that had to be the starting point. In other words, the language had to be CP/M compatible. CP/M was originally chosen because of its semi-standard acceptance. CP/M version 2.0 finalized my choice due to its expanded capabilities. As an example, my system has 8-inch double-sided, 8-inch single-sided and 5-inch single-sided drives operating simultaneously.

What language would be the best? Basic seemed acceptable, but lacked good subroutine capabilities. It further demanded restrictive variable names. What finally turned me from Basic was the fact that program clarity depended on the programmer. Any microcomputing magazine has examples of Basic programs, but they are not easy to understand. A novice, who needs all the help he can get, requires something more supportive.

Pascal, on the other hand, forces good programming performance. It is a simple but powerful high-level structured programming language. Its modern syntax is easy to understand and apply. When you are going to spend a lot of time and energy learning something, you want the maximum return for your efforts. I felt Pascal had this in its favor. Furthermore, it had strong professional support.

Price is always important, so my first effort to acquire Pascal centered around my local microcomputing club. We pooled our funds and bought UCSD Pascal at a cost of \$40 per person. It was transportable since it used the P-machine concept, had strong support and was adaptable to different I/O environments. What made it especially appealing was its use of CP/M Bios primitives.

A month later our enthusiasm fizzled. Only one of us finally got it up and running. His only printable comment was "why did I bother." Trouble started when I tried to make a copy for back-up. Pascal disks can not be copied under normal CP/M procedures. The video monitor adaption program was very confusing and the editor didn't work. The final straw, to me, was its speed. It was slow. In order to use the P-machine approach, each CPU had to have an interpreter written especially for it. All programs are then run through the interpreter...which is what makes it so slow.

Nine months later, with my UCSD Pascal still on the shelf, Ithaca Intersystem Inc. came out with its Pascal/Z. It is a true Z-80 native code Pascal compiler; no interpreter required. It is advertised as five to ten times faster than P-code implementations, is the only multi-tasking Pascal around, produces Romable re-entrant code, and is fully CP/M compatible. It cost \$275. Rather than buying it outright, I tested a friend's copy on my system. You can imagine my joy (and surprise) when it worked the first time.

Pascal/Z comes as a CP/M COM file. So for those who use CP/M, all you have to do is run it. Any Pascal program is written through the editor. In my case it's a

wordmaster. Once the program is written, it is compiled by running a program called 'Pascal.com'. This creates several files. The important one is your 'Program.src', now assembled by using another provided program called 'Asmbl.com.' This program and a library source called 'Libs.src' assembles your program into a hex file. Then, by loading the hex, you end up with 'Program.com.'. In CP/M any COM program

```
TYPE ADDN.PAS
(##|*****
*
*      PROGRAM ADDN
*
*      YOU TYPE IN N INTEGERS; AND THIS PROGRAM WILL PRINT
*      THEM AND THEIR SUM.
*
*      WRITTEN BY CHARLIE FOSTER(THY BRAIN-DRAIN) AS PRACTISE
*      IN PROGRAMING IN PASCAL.
*
*      Nov 1979
*
*****
*)

PROGRAM ADDN;

VAR
  QTY : INTEGER;      (* QUANTITY OF VALUES *)
  NUM : INTEGER;      (* INDIVIDUAL DATUM *)
  SUM : INTEGER;      (* SUM OF VALUES *)

BEGIN                (* MAIN PROGRAM *)
  SUM := 0;
  WRITE('---HOW MANY NUMBERS DO YOU INTEND TO SUM TOGETHER?-- ');
  READ(QTY);
  WHILE QTY > 0 DO
    BEGIN
      NUM := 0;
      WRITELN;
      WRITE('--- ENTER A NUMBER-- ');
      READ(NUM);
      SUM := SUM+NUM;
      QTY := QTY-1;
    END;
  WRITELN;
  WRITELN('THE SUM IS: ', SUM);
  WRITELN
END.
```

Figure 1. Simple Pascal printout.

can be run simply by typing the program name. It's about as easy as you can get.

The procedure sounds simple and it is. Here's how it's done:

- Step 1. Use your own editor and write a Pascal program following the Pascal standard as published by Jensen and Wirth.
Result = 'Program.pas'.
- Step 2. Compile it by typing 'Pascal program'.
Result = 'Program.lst.'
 'Program.src'
- Step 3. Assemble it by typing 'asmbl libs,program'.
Result = 'Program.hex'.
- Step 4. Convert it to a COM file by typing 'load program'.
Result = 'Program.com'.
- Step 5. To run, type 'program'.
Result = CP/M runs your program.

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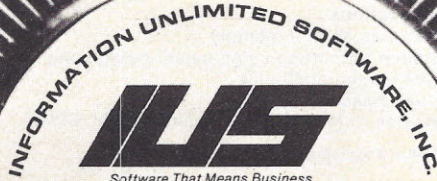


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```

TYPE ADDN.SRC
*
*      PROGRAM ADDN
*
*      YOU TYPE IN N INTEGERS, AND THIS PROGRAM WILL PRINT
*      THEM AND THEIR SUM.
*
*      WRITTEN BY CHARLIE FOSTER (THE BRAIN-DRAIN) AS PRACTISE
*      IN PROGRAMING IN PASCAL.
*
*      Nov 1979
*
*****
*)
PROGRAM ADDN;
VAR
  QTY : INTEGER;      (* QUANTITY OF VALUES *)
  NUM : INTEGER;      (* INDIVIDUAL DATUM *)
  SUM : INTEGER;      (* SUM OF VALUES *)
BEGIN
  (* MAIN PROGRAM *)
L9999
  ENTR  D,1,6
  SUM := 0;
  STMT  D,1
  MOV   -4(IY),A
  MOV   -5(IY),A
  WRITE('---HOW MANY NUMBERS DO YOU INTEND TO SUM TOGETHER?--> ');
  STMT  D,2
  JR    L10050
L10049
  DB    ' >--?REHTAEGOT NUS OT DNETNI UOY OD SREBMUN YNAM MOH--'
L10050
  LXI   H,823
  PUSH  H
  LXI   D,55
  PUSH  D
  LXI   H,-55
  DADD  S
  SPHL
  X

```

Figure 2. A portion of 'Addn.src'.

The above procedure can be demonstrated by a sample program (figure 1). It is a printout of a simple program I wrote and it shows several interesting things.

Pascal is easy to read. The very structure of the language demands good programming. Look at the upper-left corner of the program. There is a "\$I+" stuck there. It is always nice to have options for any operation. Ithaca uses that spot with that format to declare its options. Although it has ten different options, I only use one regularly. It imbeds source Pascal statements as comments in the macrocode output of the compiler (figure 2). I have enclosed a portion of 'addn.src' which is the result of the compiling.

You can see that all of the original statements are in their original form marked by a semicolon. Immediately following that statement is the Z-80 mnemonics. Another interesting feature is the way strings are handled by the compiler. Notice the DB statement—the string is printed backwards. The reason I like that option is so I have a source file deluxe. If your program has any errors during compiling, you already have a record of it for leisure debugging. That record is called 'Program.lst'. It can be erased once everything is up and running, so it does not take up any file space.

Another useful feature is the ability to call external programs written in either Pascal or Assembly Language. One application would be to take non-standard extensions written by other companies and treat them as a called subroutine. A library could be built up which would eventually do just about anything you want. Finally, remember that all of your programs will be CP/M COM files. That makes them transportable, fast, and compact. □

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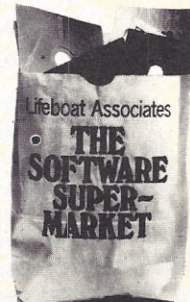
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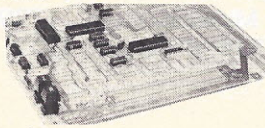
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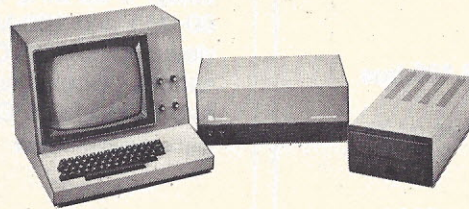
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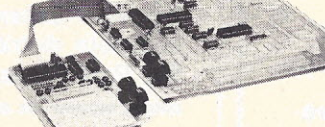
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LEVEL "A" SPECIFICATIONS

Explorer/85's Level "A" system features the advanced Intel 8085 cpu, an 8355 ROM with 2k deluxe monitor/operating system, and an advanced 8155 RAM I/O ... all on a single motherboard with room for RAM/ROM/PROM/EPROM and S-100 expansion, plus generous prototyping space.

PC Board: Glass epoxy, plated through holes with solder mask. • **I/O:** Provisions for 25-pin (DB25) connector for terminal serial I/O, which can also support a paper tape reader ... cassette tape recorder input and output ... cassette tape control output ... LED output indicator on SOD (serial output) line ... printer interface (less drivers) ... total of four 8-bit plus one 6-bit I/O ports. • **Crystal Frequency:** 6.144 MHz. • **Control Switches:** Reset and user (RST 7.5) interrupt ... additional provisions for RST 5.5, 6.5 and TRAP interrupts on-board. • **Counter/Timer:** Programmable, 14-bit binary. • **System RAM:** 256 bytes located at F800, ideal for smaller systems and for use as an isolated stack area in expanded systems ... RAM expandable to 64K via S-100 bus or 4k on motherboard.

System Monitor (Terminal Version): 2k bytes of deluxe system monitor ROM located at F800, leaving 8000 free for user RAM/ROM. Features include tape load with labeling ... examine/change contents of memory ... insert data ... warm start ... examine and change all registers ... single step with register display at each break point, a debugging/training feature ... go to execution address ... move blocks of memory from one location to another ... fill blocks of memory with a constant ... display blocks of memory ... automatic baud rate selection to 9600 baud ... variable display line length control (1-255 characters/line) ... channelized I/O monitor routine with 8-bit parallel output for high-speed printer ... serial console in and console out channel so that monitor can communicate with I/O ports.

System Monitor (Hex Keypad/Display Version): Tape load with labeling ... tape dump with labeling ... examine/change contents of memory ... insert data ... warm start ... examine and change all registers ...

single step with register display at each break point ... go to execution address. Level "A" in this version makes a perfect controller for industrial applications, and is programmed using the Netronics Hex Keypad/Display. It is low cost, perfect for beginners.

HEX KEYPAD/DISPLAY SPECIFICATIONS

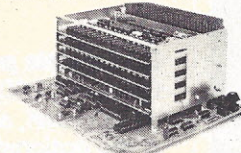
Calculator type keypad with 24 system-defined and 16 user-defined keys. Six digit calculator-type display, that displays full address plus data as well as register and status information.

LEVEL "B" SPECIFICATIONS

Level "B" provides the S-100 signals plus buffers/drivers to support up to six S-100 bus boards, and includes: address decoding for on-board 4k RAM expansion selectable in 4k blocks ... address decoding for on-board 8k EPROM expansion selectable in 8k blocks ... address and data bus drivers for on-board expansion ... wait state generator (jumper selectable), to allow the use of slower memories ... two separate 5 volt regulators.

LEVEL "C" SPECIFICATIONS

Level "C" expands Explorer/85's motherboard with a card cage, allowing you to plug up to six S-100 cards directly into the motherboard. Both cage and card are neatly contained inside Explorer's deluxe steel cabinet. Level "C" includes a sheet metal superstructure, a 5-card, gold plated S-100 extension PC board that plugs into the motherboard. Just add required number of S-100 connectors.



Explorer/85 With Level "C" Card Cage.

LEVEL "D" SPECIFICATIONS

Level "D" provides 4k of RAM, power supply regulation, filtering decoupling components and sockets to expand your Explorer/85 memory to 4k (plus the origi-

nal 256 bytes located in the 8155A). The static RAM can be located anywhere from 8000 to EFFF in 4k blocks.

LEVEL "E" SPECIFICATIONS

Level "E" adds sockets for 8k of EPROM to use the popular Intel 2716 or the TI 2516. It includes all sockets, power supply regulator, heat sink, filtering and decoupling components. Sockets may also be used for 2k x 8 RAM IC's (allowing for up to 12k of on-board RAM).

DISK DRIVE SPECIFICATIONS

- 8" CONTROL DATA CORP. professional drive.
- LSI controller.
- Write protect.
- Single or double density.
- Data capacity: 401,016 bytes (SD), 802,032 bytes (DD), unformatted.
- Access time: 25ms (one track).

DISK CONTROLLER I/O BOARD SPECIFICATIONS

- Controls up to four 8" drives.
- 1771A LSI (SD) floppy disk controller.
- Onboard data separator (IBM compatible).
- 2 Serial I/O ports.
- Autoboot to disk system when system reset.
- 2716 PROM socket included for use in custom applications.
- Onboard crystal controlled.
- Onboard I/O baud rate generators to 9600 baud.
- Double-sided PC board (glass epoxy).

DISK DRIVE CABINET/POWER SUPPLY

- Deluxe steel cabinet with individual power supply for maximum reliability and stability.

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Beginner's Pak (Save \$26.00!) — Buy Level "A" (Terminal Version) with Monitor Source Listing and AP-1 5-amp Power Supply: (regular price \$199.95), now at SPECIAL PRICE: \$169.95 plus post. & insur.

Experimenter's Pak II (Save \$53.40!) — Buy Level "A" (Hex Keypad/Display Version) with Hex Keypad/Display, Intel 8085 User Manual, Level "A" Hex Monitor Source Listing, and AP-1 5-amp Power Supply: (regular price \$279.35), all at SPECIAL PRICE: \$219.95 plus post. & insur.

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Special! Complete Business Software Pak (Save \$625.00!) — Includes CP/M 2.0, Microsoft BASIC, General Ledger, Accounts Receivable, Accounts Payable, Payroll Package: (regular price \$1325), yours now at SPECIAL PRICE: \$699.95.

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- ☐ Explorer/85 Level "A" kit (Hex Keypad/Display Version) ... \$129.95 plus \$3 post. & insur.
- ☐ 8k Microsoft BASIC on cassette tape, \$64.95 postpaid.
- ☐ 8k Microsoft BASIC in ROM kit (requires Levels "B", "D" and "E") ... \$99.95 plus \$2 post. & insur.
- ☐ Level "B" (S-100) kit ... \$49.95 plus \$2 post. & insur.
- ☐ Level "C" (S-100 6-card expander) kit ... \$39.95 plus \$2 post. & insur.
- ☐ Level "D" (4k RAM) kit ... \$69.95 plus \$2 post. & insur.
- ☐ Level "E" (EPROM/ROM) kit ... \$5.95 plus 50¢ p&h.
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- ☐ 64k RAM kit ... \$499.95 plus \$2 post. & insur.
- ☐ 16k RAM Expansion kit (to expand any of the above in 16k blocks up to 64k) ... \$99.95 plus \$2 post. & insur, each.
- ☐ Intel 8085 cpu Users' Manual ... \$7.50 postpaid.
- ☐ 12" Video Monitor (10MHz bandwidth) ... \$139.95 plus \$5 post. & insur.
- ☐ Beginner's Pak (see above) \$169.95 plus \$4 post. & insur.
- ☐ Experimenter's Pak (see above) ... \$219.95 plus \$6 post. & insur.
- ☐ Special Microsoft BASIC Pak Without Terminal (see above) ... \$329.95 plus \$7 post. & insur.
- ☐ Same as above, plus ASCII Keyboard Terminal With Cabinet, Get Free RF Modulator (see above) ... \$499.95 plus \$10 post. & insur.
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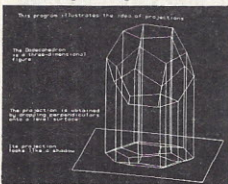
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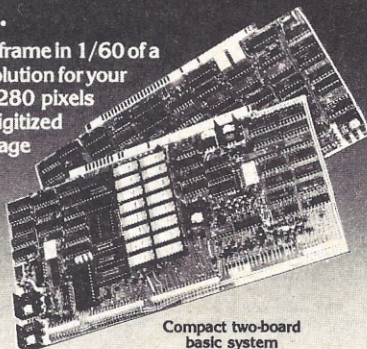
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Free Literature

Oscilloscopes. A 16-page bulletin describes complete line of equipment including 15-MHz dual-trace dual-beam oscilloscopes, a 25-MHz scope with signal delay, a 30-MHz unit with variable trigger delay, and 60-MHz and 100-MHz scopes with third channel trigger view and holdoff. Catalog 449-16, Marketing Communications, Gould Inc., Instruments Div., 3631 Perkins Ave., Cleveland, OH 44114.

CIRCLE INQUIRY NO. 327

Business applications. Five literature sheets outline the uses of Microstar business systems including accounts payable, Stardos business Basic, general ledger, Flexitex word processor and mail list, and a complete distribution system. Micro V. Corp., 17791 Sky Park Circle, Irvine, CA 92714, (714) 957-1517.

CIRCLE INQUIRY NO. 328

Mini controller. A 2-page brochure details the model 4100 line printer controller used to interface a line printer to the Unibus of the DEC PDP-11 computer family. 4100 Bulletin, Digital Assoc. Corp., 1039 E. Main St., Stamford, CT 06902.

CIRCLE INQUIRY NO. 329

Benefits of tape. A brochure outlines the advantages of 1/2-inch streaming tape as a data storage medium for minicomputer users. Examined are cost effectiveness, average reliability, cost of hardware, and data access time. Cipher Data Products, Marketing Dept., 10225 Willow Creek Rd., San Diego, CA 92131, (714) 778-9100, ext. 249.

CIRCLE INQUIRY NO. 330

Dot matrix printer. A 6-page brochure describes the Epson TX-80, designed to interface with TRS-80, Apple, Atari, and other small computers. Also described is the optional Grafrax high-resolution bit plot graphics capability. Epson America, Inc., 23844 Hawthorne Blvd., Torrance, CA 90505, (213) 378-2220.

CIRCLE INQUIRY NO. 331

Memory products. A 4-page brochure describes line of cartridge disk drives, magnetic tape transports, and formatters. Designed for OEMs, systems houses, and specialized equipment manufacturers. Perkin-Elmer, Memory Products Div., 7301 Orangewood Ave., Garden Grove, CA 92641, (714) 891-3711.

CIRCLE INQUIRY NO. 332

Voice synthesis. An 8-page brochure describes the line of TI solid state speech products and services, including linear predictive coding technology, vocabulary development, voice synthesis processors and memories, and custom speech modules. Texas Instruments, Attn: CL-501, Box 225012, M/S 308, Dallas, TX 75265.

CIRCLE INQUIRY NO. 333

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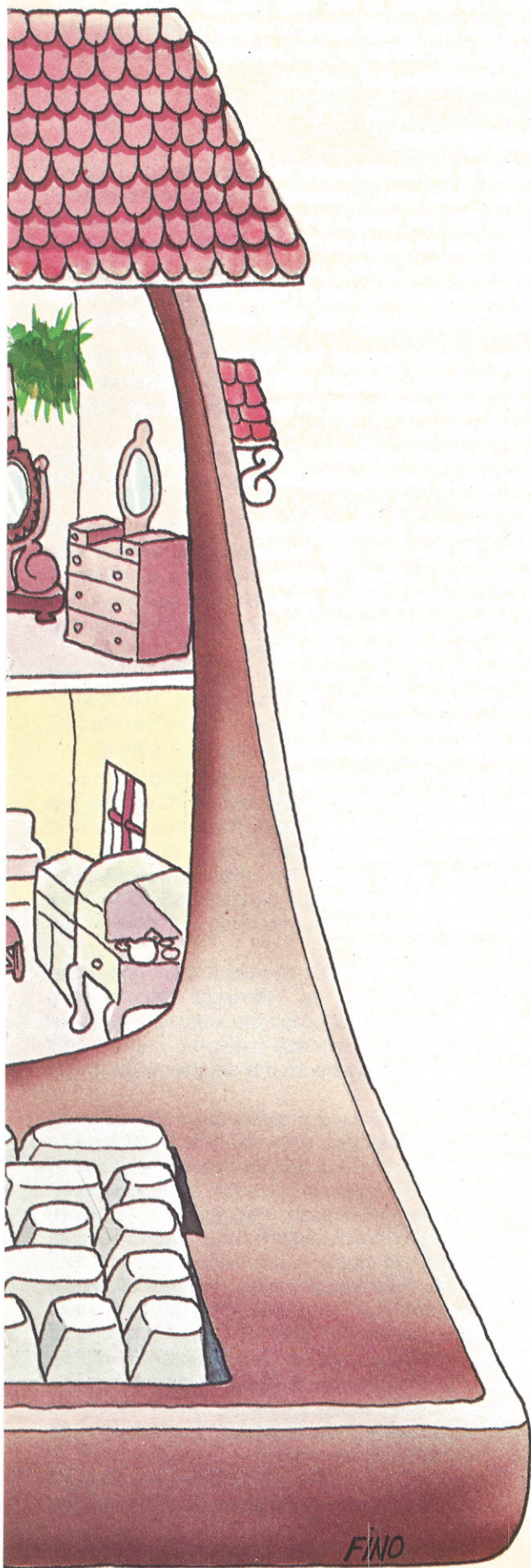
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Heat Loss Audit

by William J. Spitz

In the war against loss of energy, the ability to develop reliable intelligence reports is crucial to waging a successful battle. In order to make effective thermal improvements to your house, it is essential to have a clear understanding of what energy is, why it is lost, and, most importantly, where the loss is occurring. Once armed with an accurate energy audit detailing the locations and amount of heat losses, prepare to analyze the cost effectiveness of thermal improvements. Knowing the cost and savings to be realized from making the changes, it is possible to calculate the payback period—that is the number of years it will take to recover your investment in thermal improvements.

Improving the thermal characteristics of a house does not always involve substantial sums of money. As we shall see, infiltration can be the primary source of heat loss in older homes, and these losses can be cut dramatically by proper weatherstripping and caulking. The materials needed for reducing infiltration losses are

low cost and can be the most cost effective improvements you can make.

The energy audit

Its purpose is to pin down the location and amount of energy lost from a house. The objectives are to categorize all of the surfaces through which heat energy passes out to the environment and determine the rates at which energy flows through the particular surface. Taken step-by-step, the audit is a straightforward process that will really give an accurate thermal profile.

We will be looking for only two values for each of the different surface areas. We will need to know the total area in square feet for each different surface such as walls, windows and ceilings. We will also need to find the rate at which a particular surface passes heat from the inside to the outside.

The loss rate is found in the charts provided and is called the U factor. It represents the number of BTUs lost per-square-foot-per-hour for each degree difference between the inside and outside temperatures. The accuracy of the audit is dependent on the accuracy of measurements taken. In this case, measurements to the half foot are sufficient.

An accurate appraisal of the U factors for the various components is essential for a valid energy audit. The charts provided give some of the more common values for residential structures. If your home is of unusual configuration, I recommend purchasing a copy of *The Homeowner's Energy Guide* by John A. Murphy, Thomas Y. Crowell Co., New York, NY. The guide contains extensive tables for calculating U factors for most residential houses and excellent tips on energy conservation practices. Much of my program is based on Murphy's approach to energy auditing.

Given any particular house, fuel costs will vary with its location, the type and price of fuel used, and the efficiency of the heating system.

Computing degree days

The climactic value relating to fuel costs can be summarized with one value, the number of degree days in one year. The degree-day-of-year value represents the number of days the outside temperature is below the base value of 65°F and how much lower the temperature is below the base. This data is available from the *Homeowner's Energy Guide*, National Climactic Center, Federal Building, Asheville, NC 28011 (15¢) or from your local weather bureau. For instance, in Marquette, Michigan, the degree days for the year is 8393, while in Fairbanks, Alaska, it was 14,279, in Miami Beach 141.

Each type of fuel used for home heating has a particular value of BTUs per unit of fuel. A gallon of fuel oil has 144,000 BTUs of heat energy upon combustion. These values are built into the program for the five different types of fuel listed. However, if you use a heat pump or burn wood with a different heat value than soft maple, you can make those adjustments in the program.

In addition to the type of fuel used, we must consider the performance of the heating unit. Electric is nearly 100% efficient. An oil furnace is approximately 70% efficient if it is in good operating condition. But it may be substantially less in an older furnace. You can adjust the COP (coefficient of performance) factor according to your situation. Wood stoves are notoriously inefficient, thus the COP is lower in most cases. Stoves that

combust the volatile gases in wood come a little closer to oil furnace efficiency, so use your judgement.

The price of fuel is continually changing, so enter the price you are paying at the time you do the audit. You can also run the audit using another type of fuel to determine if it would be to your advantage to convert to another type of heating system.

The questionnaire

Included is a questionnaire to follow as you inspect your home. Take each component, measure the dimensions, and list the values on the questionnaire. Write down the type of construction or the thickness of the insulation and look up the values on the charts before running the program. Make a rough sketch of the floor plan as an aid in calculating floor and ceiling areas.

Windows: Enter length and width. Measure to the edge of the glass; treat all sliding glass doors as windows. If a door opens into an unheated garage, treat it as an exterior door.

Doors: Measure all exterior doors and enter the data. If a door opens into an unheated garage, treat it as an exterior door.

Walls: Measure the height from the bottom edge of the siding to the roof line. Include gable ends if you have cathedral ceilings. You do not have to subtract the door and window areas from the total wall area; this is done in the program for you. Just enter the wall as a length and a height with a U factor.

Ceilings: Take the area from the floor plan and measure the thickness of the insulation in the attic or crawlspace. If you have a 1½-story home, treat the half walls as walls and the pitched ceiling as a ceiling.

Slab: Record the dimensions of the slab floor in a basementless home. Or the basement floor and the basement walls 2 feet below grade if you have a heated basement. The degree-day-year value used for the component is 2500 since the ground temperature below the frost line is usually a constant 45-50°F. This is written into the program and does not have to be altered to run the audit.

Basement: If you heat the basement, enter just those areas below grade and up. Measure the distance around the basement if it's not the same as the floor plan and the height of the wall indicated above. This area faces the same climate as the exterior walls and is treated accordingly.

Crawlspace: If you have a crawlspace beneath the house that is not insulated, treat the ground surface as a slab and enter the surface area of the wall exposed to the weather as crawlspace in the audit. If the floor is insulated, use the crawlspace segment to calculate losses through the floor. Measure the amount of insulation and enter the U factor in the crawlspace column.

Infiltration: As mentioned earlier, infiltration losses can be the greatest part of your heating bill if you have a drafty house. Determine the infiltration qualities of your house from your experience and enter an infiltration factor from the table. A .5 rating would represent a new "energy" house while a 2 rating would satisfy an old clapboard house with no insulation and single-pane windows that rattled in the wind.

Heat Gains: Included in the program is a segment on heat gains from two common sources of heat in single-family homes.

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Paper Tiger 460 Print Sample

resolution graphics option. RS232 and parallel interfaces. And more.

But its most important feature is high reliability. Paper Tiger 460 is designed to be tough and dependable. It has rugged, stepper-motor head and paper drives. A new rugged ballistic-type print head.

And its simple, chassis-mounted cartridge ribbon lasts up to four times longer than cassette or spool ribbons.

Paper Tiger 460 is the one printer that gives your Apple,† TRS-80,‡ or other small business computer both data processing and word processing output. At a price you can afford.

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Paper Tiger 460



Integral Data Systems, Inc.

CIRCLE INQUIRY NO. 30

*Suggested single-unit U.S. retail price.

†Apple is a trademark of Apple Computer Inc.

‡TRS-80 is a trademark of Radio Shack, a division of Tandy Corp.

Degree Day Year: _____

Type of Fuel: _____ Natural Gas _____ Fuel Oil _____ Electric _____ L.P. Gas _____ Wood

Price of Fuel: Last season _____

This season _____

Fuel Bill: Last season _____

Component Part	Area/sq. ft.	U factor	
		Present	Recommended
Windows			
Doors			
Walls			
Ceilings			
Slab			
Basement			
Crawlspace			

Infiltration factor

_____ .5 Very tight _____ 1.0 Average _____ 1.5 Drafty _____ 2.0 Very drafty

Electrical consumption: _____ kwh per month (average)

Number of occupants: _____

Rough sketch of floor plan

Figure 1. Home heat loss audit questionnaire

Occupants: While the heat gain from the human body is insignificant, it is one of the many components involved in the thermal system of your home. List the number of persons living in the house and you will calculate the heat gain from its occupants.

Electrical Heat Gain: Also included in the program is a segment that converts half of your electrical usage to heat. This seems to be a workable figure considering the efficiency of most lighting systems and the fact that much of the heat from the water heater and the oven is lost to the inside of the home. List the average kilowatt hour used per month. Check your electric bill for this information.

Type of Fuel: Record the type of fuel you use to heat your home.

Cost of Fuel: If you know your fuel cost from last season, adjust the infiltration factor until you get a projected cost close to your actual costs. The infiltration losses then float to pick up the losses not due to surface area losses, which are fixed. Based on actual fuel costs, the infiltration factor gives a good idea of how well your home is weatherstripped.

Cost of Fuel This Season: If you are faced with increases in the cost of fuel, you can project your costs by running the program with the projected fuel cost increases.

Solar heat gain is not treated as a gain in this program, but this does not mean it should not be considered. The less heat required to maintain comfort levels, the more attractive solar energy becomes. There are many solar energy information sources located around the country. By contacting them, you get a good idea of the amount of solar heat your home will gain.

As an engineer, I consider solar energy a freebie and approach most audits without considering solar heat gain. The possibility of some gain is always there, but I don't rely on it when sizing heating systems. Of course for those in the sun belt, it is essential to consider solar gains because of its significance in the overall picture.

After you have collected your data, sit down with the U-factor tables and estimate the U factor for each component. Nearly all of the commonly available building materials have been tested for their R ratings (resistance of a material to the movement of heat through material) and you get accurate estimates of composite wall constructions if you use these tables. Again, the audit is only as accurate as the figures you feed it so use care arriving at U factors.

Running the Program: After you have typed in the program and filled in the questionnaire, you are ready to run the program. If you are going to make changes in the COP rating of your furnace, go to the appropriate line between 240 and 320 and make the change for the variable C. If the efficiency of the unit is 80%, enter its reciprocal or 1.25 since you will have to consume 1.25 more fuel to make up for the heat lost up the chimney or from incomplete combustion.

Entering data

Windows: Use a hand calculator to total the surface areas of all the windows in your home. This will speed data entry and reduce the chances of making mistakes. For instance, if the total surface area is 120 square feet, enter 10 x 12 and that will take care of the win-

Continued on Page 134

Finally

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Terminals—They Do More and Cost Less

by Roger H. Edelson

Terminals, formerly only glass teletypes, now range for the mundane "dumb" style to high-IQ, high-resolution image processors. The greater use of LSI, and now VLSI, have provided increased capability throughout the entire range of terminal intelligence. Top-of-the-line models present displays in multi-color format, have extensive graphics capability, and may possess a multi-page memory.

Even the "dumb" terminals, at the other end of the spectrum, now offer enhanced features, including numeric pads, fast serial data transfer rates (up to 19,200 baud) or augmented display modes. Some mid-range terminals possess the ability to mimic the control code assignment of other manufacturers' terminals to allow direct replacement and software compatability.

While the overall intelligence and capabilities of terminals have been increasing steadily, prices have been quite stable or even somewhat lower, and reliability has gained steadily. As mentioned earlier, these product enhancements stem primarily from advancements in semiconductor technology allowing the widespread incorporation of LSI and VLSI, i.e., single-chip video controllers and 16K (and larger) memory chips. These trends should continue with more manufacturers producing in-house integrated circuits optimized for their specific terminal requirements.

One side effect of this availability of ultra-high capability ICs has been to provide easy entrance into the marketplace by new suppliers. The proliferation of terminal manufacturers provides the end-user with a wide variety of choices, feature/cost comparisons, and

downward price pressure. This fluid market situation, coupled with greatly increased small-business computer usage, has acted to increase the demand for terminals which has, in turn, fueled the desire to participate in the expected bonanza.

Color hype takes hold

A case in point is color graphics, which has only required the entry of a major manufacturer to provide the psychological support for this segment. The lure of the expected market has caused the emergence of the requisite major manufacturer—IBM with the announcement of its model 3279 low-end multi-color graphic terminal.

In view of this wide open marketplace, let's see what a prospective business-oriented user finds when he goes shopping for a terminal. There will be no attempt to cover every model nor every manufacturer. Instead it is hoped to provide a look at the capabilities available in representative devices.

The low end of the terminal intelligence spectrum promised not much more than a screen, keys, and a moderate baud rate serial port. Terminals in this category now possess a 19,200 baud rate serial I/O (the LSI ADM-3A) cursor addressing and sensing (the Hazeltine 1400), or a separate numeric pad (the Hazeltine 1410). The LSI ADM-3A provides additional options with lower case, separate numeric keypad, answer back, and a split-baud rate all available.

Smarter terminals boast enhanced video modes, upper/lower case (most with descenders), larger character matrices, and special function keys. Most terminals in this class (including the dumb style) present their characters in a 24-line, 80-character format on either a 9-inch or 12-inch (diagonal measure) screen. However screen sizes of 5 inches and 15 inches (LSI ADM-42) are available as are 25 x 80 (Beehive International—Micro BI), or 60 x 80 (Ann Arbor Terminals—6080-Compat) character formats. In this category, the character matrix size may vary from a minimal 5 x 7 (Soroc IQ-120) through 8 x 10 (Intertech's Intertube II). The LSI ADM-31 or 42 sports a 7 x 9 matrix, while the Hazeltine 1500 series uses a 7 x 10 cell, and Soroc IQ-140 provides a 5 x 9 matrix in a 7 x 10 field.

Video modes are extensive including reverse video, dual (or triple) intensity, blinking, blanking, and underline capability. Most smart terminals possess, at least, dual intensity and normal/reverse video. The LSI ADM-42 provides blinking, blanking and underlining as well as two pages of memory, with the ability to increase memory size to eight pages.

Smart terminals provide many editing features as standard. The Hazeltine 1500 series features the ability to provide protected/unprotected data fields, insert/delete line commands, and various screen clear modes. The Soroc IQ-140 possesses these edit capabilities plus a phase inserting mode. The LSI ADM-42 provides page edit modes, a keyboard lock, as well as the standard edit modes.

Smart terminals usually provide a variety of data transmission rates and a variety of transmission modes including numerous block transmission and conversational formats. The Beehive Micro B2 allows data transmission to be selectively designated as conversational, line, message, or page, plus a forms mode which allows the operator to prepare a form with specific

visual and logical attributes and then transmit it to the host computer.

At the high end of the terminal intelligence spectrum are devices that can be programmed, and operate much like stand-alone computers. These terminals typically use one, and in many cases two, microprocessor ICs. The primary microprocessor is used for all the host computer to terminal I/O and screen display functions, while the secondary MPU serves to unload the primary MPU during data transfer to the terminal storage medium.

These terminals generally feature off-line data storage using either disk or cassette drives. For example, the Intertech Superbrain contains twin Z80As operating at 4 MHz, 64K bytes of dynamic RAM, 256 bytes of static RAM, 1K bytes of ROM, and the capability to store 320K total bytes formatted. The formatted storage uses two double-density 5¼-inch mini-disks, and provision has been made for adding an optional 10-300 megabyte hard disk. This intelligent terminal also provides optional software capability, including Fortran, Cobol, and Basic using CP/M as the disk operating system.

Almost all intelligent terminals possess the ability to produce graphics of some kind. This capability extends downward to the smart terminals also. This graphic capability is usually provided by adding the ability to display special characters which use different portions of the entire displayable cell. The symbol size can range from one segment of the character cell to the entire cell including the normally blank intercharacter and inter-line positions. This feature allows the generation of continuous lines.

The "key" difference

Intelligent terminals differ from the smart ones by the provision of more versatile special function keys. These keys may be defined by the manufacturer for edit and format control or may be user definable under software control (as in the intelligent Intertech Superbrain).

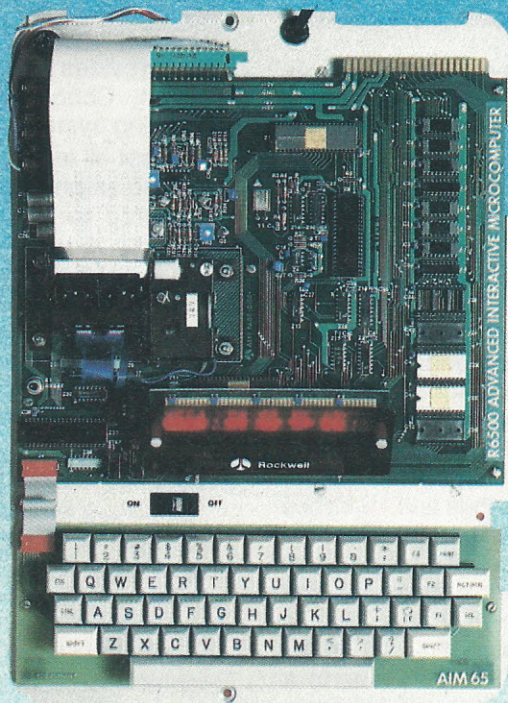
Top-of-the-line CRT terminal capability is the color-graphic interactive processor. This device provides interactive operator control to enhance or manipulate the displayed image. Tektronix with the 4027, Aydin's 5217, IBM 3279, the Sander's product are representative of the color CRT terminals available. Color terminals fall into two classes: the vector-format (calligraphic), or the more television-like raster-scan.

The Sanders color indicator is an example of the vector approach using a beam-penetration technique. The Tektronix 4027 is a representative example of the raster-scan format and supports 64 colors of which any eight may be displayed simultaneously. The IBM 3279 will maximally provide seven colors with a 760 by 384 point resolution. Color terminal resolutions can range from 1024 x 1024 down to a coarse 256 x 256 with various combinations in between.

The bottom line, of course, is price, and terminal cost can range from just above \$500 for the dumb terminals to \$3500 for the intelligent monochrome models. Color terminals can be purchased for between \$4000 and \$7000 depending on the number of colors and features. The interactive color-graphic systems start in the medium five-figure range and proceed upward. Depending on the size of the business-oriented user's pocketbook, any degree of display capability can be had. □

System of the Month

Rockwell Aim 65



by Tom Fox

When the name Rockwell International is mentioned, one usually thinks of aircraft, space vehicles and military hardware—not little bitty computers such as the one we're scrutinizing this month. What's the connection?

Deeply involved in our once-burgeoning space effort, Rockwell became an early specialist in the computer-dependent aspects of the moon race, which once held America fascinated. Computers, it turned out, were at least as critical to the effort as reliable rocket engines and freeze-dried foods. Not only big computers in Houston, but little, portable ones that were light enough, smart enough and—above all—reliable enough to compute real-time landing trajectories to Tranquility Base.

These strict and conflicting necessities mothered the invention of a computer whose major elements could be contained on a single, fingernail-size silicon wafer. The result was the microprocessor which, in

civilian garb, is the basis for nearly all of the microcomputers that are sprouting by the millions in homes, business and (even) spacecraft.

Rockwell emerged as a major supplier of one of the miniscule wonders—the 6502—and a double handful of support chips which are needed to transform a *microprocessor* into a *microcomputer*. These devices found their way into such products as the Commodore PET, Ohio Scientific Challenger series and Apples I through III.

It is common practice for chip manufacturers to offer a limited quantity of "development systems" to engineers who would venture to incorporate a microprocessor into their proprietary design. A development system is usually a single circuit card containing a functional aggregate of semiconductors (leaving plenty of room for the engineers to add their own parts), along with a bare minimum of software to

get the assemblage working. The purchaser is often responsible for such things as power supply, keyboard, display, printer and any software that would allow the machine to perform a useful task.

In the Aim 65, however, Rockwell has designed a development system that is so close to being a "real" computer that it is sure to find a home with a lot of end users. We'll describe what the unit is and does, but perhaps we should list some of the things an Aim 65 is *not*:

- For those who know nothing of the tiniest details of computer operation, and not interested in learning them; if the terms stack pointer, expansion bus and shift register mean nothing to you, pass this one up.

make a good combination.

Hardware consists of two etched circuit cards rather loosely packed with electronic parts. The smaller of the two cards serves simply as the base for a full-sized keyboard. It has 53 full-size keys arranged typewriter-like and includes a control character capability, a 'del' key (for erasing single-character mistakes) and three special keys whose functions can be assigned in software.

The keyboard attaches via a very short flat-conductor cable to the main circuit card, measuring just under a foot square. This board contains up to 17 major plug-in integrated circuits and a dozen or so of lesser complexity that are soldered into place. It also includes a varied collection of discrete components



- A machine that could perform business-related tasks such as financial accounting, word processing, etc.
- A toy—although if learning is your idea of fun, the Aim 65 can be chock full.

In addition to its originally intended purpose, the Aim 65 is perhaps most useful as an educational tool. Those knowledgeable in electronic circuitry will find the machine a learning transition into the software world. On the other hand, "pure" programmers will find the Aim 65 to be absolutely incomprehensible until they learn a little about its hardware.

People unfamiliar with either discipline will find few better tools for learning the intimate interrelationship between hardware and software. But be warned: It's a tough course if you're starting from zero, and the Rockwell documentation isn't written for the novice. A personal Aim 65 and a class on how it works would

(transistors, resistors, capacitors, etc., as well as a single 4-megahertz crystal) that are needed to perform surprisingly varied functions.

The largest components are instantly recognizable as an adding machine-type printing device and a large calculator-style light-emitting diode (LED) display. These latter two devices give the processor the means for communicating back to the operator.

The rear of the main circuit board is made up of a pair of 44-pin edge connectors for interfacing with external equipment. A screw-terminal connector is there, too, so that you can hook up your DC power supply to the unit. Notice we said your power supply; the Aim 65 doesn't come with one, and Rockwell doesn't make one. This curious fact is the only thing that keeps the Aim 65 from being a "stand alone" microcomputer.

The voltages required are common ones, however (+5V @ 2A regulated and +24V @ 2.5A unregulated), and Rockwell lists no fewer than nine separate com-

panies that carry them. A new Aim 65 owner is baptized immediately into the world of hardware problems in a search for three feet of four-conductor cable before the new acquisition can flip its first bit.

Three tiny switches complete the hardware. One is the 'reset' button to start up the computer. Another is a switch that disables the keyboard and on-board printer when an external teletype or CRT terminal is connected. This device, incidentally, must have a full duplex 20mA current loop capability, and can work at any of the standard baud rates up to 9600. Data is encoded in Ascii. Finally, a 'single step' switch forces the processor to stop after each instruction for program debugging or to test external hardware interfaces.

Total Ascii display

The LED display presents a single line of twenty 3/16-inch-high characters. It can represent the entire set of 64 upper-case Ascii characters, albeit with an occasional awkwardness due to the limitations of its 16-segment format. Sitting behind the keyboard, the display acts like a tiny ruby single-line CRT display, with the program output scrolling immediately out of sight after flickering into existence for a brief moment.

The printer is a cleverly simple thermal unit whose capabilities match that of the LED display almost exactly. All of the 64 Ascii characters can be shown, 20 characters per line. The print head wiggles back and forth a fraction of an inch a few times to generate a line of text. Printing speed is listed as 120 lines per minute, although it can be adjusted over a wide range with a screwdriver (as can the print darkness).

That figures out to 40 characters per second, if the display lines are full. The printer acts as an echo to the LED display, with each line being transferred to the printer as the display fills up. A running program that spills output to these devices is constantly waiting for the printer to catch up. Turning off the printer allows such programs to run at full speed—but the characters are thrown at the LED display much too fast to read.

These two peripherals seem a perfect match for the capabilities of the Aim 65. They are certainly inexpensive: Spare LED displays can be had for \$29.25. The printer is by far the most costly replaceable part at \$74.70. (The 6502 chip itself lists for a mere \$9.80.)

The 6502 microprocessor is, of course, the "brains" of the Aim 65. The 6502 is an 8-bit device, meaning that its internal memory elements contain data as 8-bit bytes (rather than as 16-bit words, as with most minicomputers, or 36-bit words like an IBM 370). You can only count from zero to 255 with eight binary digits (bits), which means larger numbers must be broken down into byte-size chunks and processed a piece at a time. Herein lies the major reason that larger machines are appreciably faster than their 8-bit cousins. At \$9.80, though, you can't complain; and, as 8-bit micros go, the 6502 has always been among the fastest of the lot. In common with all but the newest of today's crop of microprocessors, the 6502 supports a 16-bit wide memory address bus, so it can directly access up to 65,536 (64K) distinct memory locations at random.

Internally, the 6502 frustrates the assembly-language programmer by offering but two index registers and a single accumulator, in addition to the normal stack pointer, program counter and processor status registers. This is compensated for by allowing no

fewer than 13 distinct addressing modes for certain machine instructions.

The processor can execute a total of 56 different instructions. The 6502's three major external buses (address, data and control) are routed as necessary around the Aim 65 circuit card, and appear "raw" at an expansion connector at the rear of the machine.

In keeping with its size and probable use, the Aim 65 card will hold only four kilobytes (4096 characters) of RAM and 20 kilobytes of ROM. All memory is of the static type, which reduces the circuit complexity at the modest penalty of increased power consumption when compared to dynamic RAMs.

The Aim 65 is a fair showpiece for other Rockwell chips in the 65XX product line. The 6532 RAM input/output timer (known affectionately as RIOT) is a multi-function device used primarily to sort out keyboard entries. A 6520 programmable interface adapter handles the complex multiplexing tasks needed to drive the 20-character LED display. A pair of 6522 versatile interface adapters (VIA) handles the balance of the I/O tasks.

Each comprises a pair of parallel and single serial ports, all of which have both input and output capability. The VIA also features an on-chip interval timer and event counter, and can support waveform synthesis and pulse width modulation tasks. One of the VIAs supplies output to the thermal printer, external teletype-like device and two separate audio cassettes.

Software is actually what is known as "firmware," since it is supplied as program instructions that are imbedded permanently into the structure of ROM chips. Each chip contains four kilobytes of runnable programs, and plugs into a socket provided on the circuit card. The standard ROM contains a real-time interactive monitor, text editor and "instant" assembler.

Booting-up commands

When you turn on the Aim 65 or push the 'reset' button, the machine will accept the following:

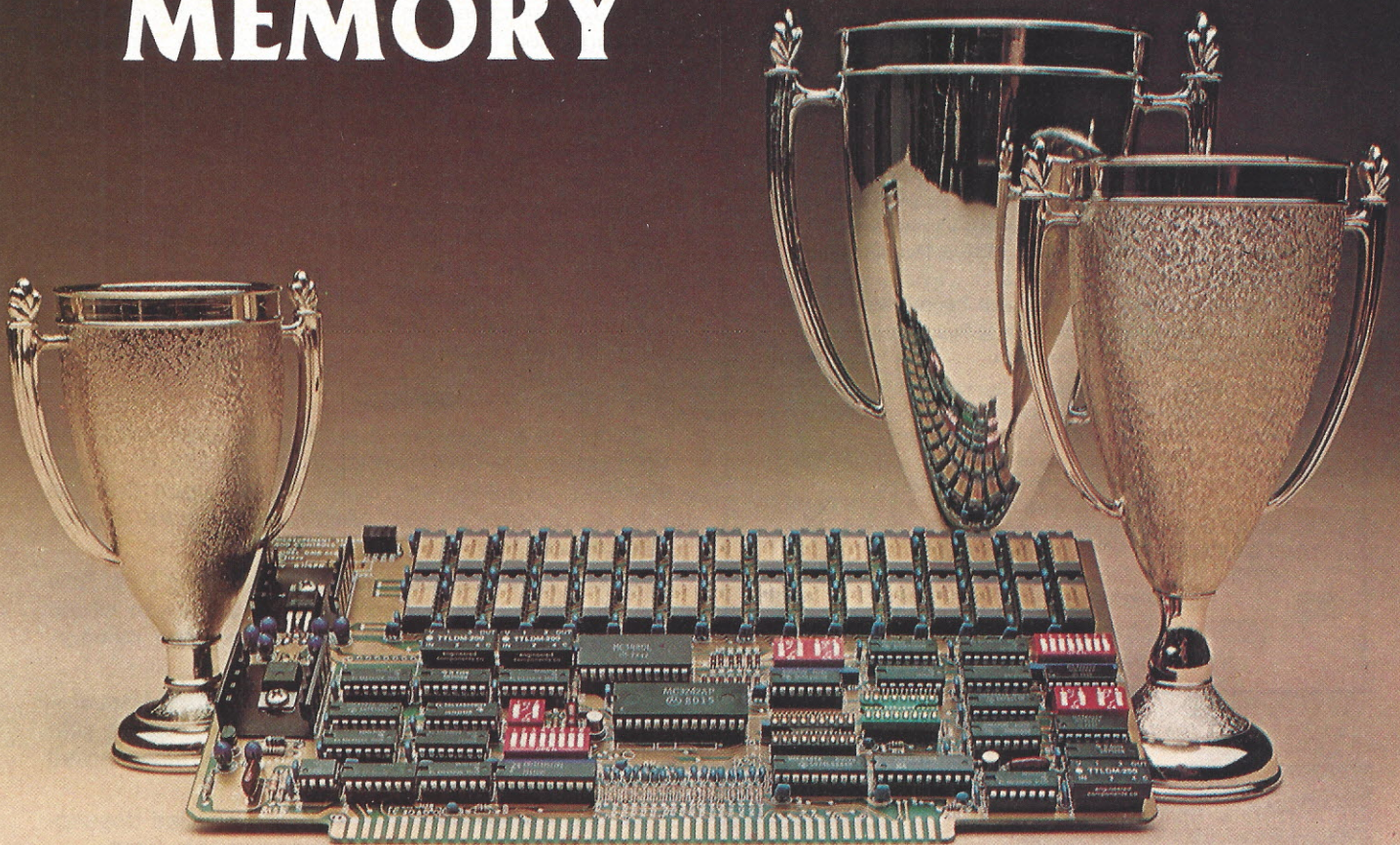
- N—enter assembler
- E—enter text editor
- T—reenter editor (without clearing memory)
- I—enter mnemonic instruction entry mode
- K—enter instruction disassembly mode
- G—execute program
- 5—enter Basic
- 6—reenter Basic (without clearing previous program)

Once invoked, the editor has its own set of single-character instructions. It's a sparse collection, but includes such things as 'F)ind' and 'C)hange' character strings. Actually, the editor's greatest limitation is the single-line nature of the LED display, rather than any shortcomings in the firmware package.

Eighty-five dollars will buy a 4-kilobyte ROM containing an assembler far more capable than the simple one supplied as part of the monitor. The assembler does what assemblers usually do: convert mnemonic representations of 6502 instructions (entered by you via the editor) into chip-readable binary codes.

The assembler allows symbolic absolute addressing but lacks big-machine features such as macro definition capability. No help is provided for linking together small program modules to make a big one. The Rockwell documentation is most helpful to the assembly-language programmer, even to the extent of describing

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how to call a set of handy subroutines that are a permanent part of the monitor. Subroutines are available for often-used tasks such as accepting characters for the keyboard and sending them to the printer.

The \$100 pair of 4-kilobyte Basic ROMs contains a surprisingly complete Basic interpreter created by Microsoft. This implementation includes such goodies as arrays, string parsing and the ability to call assembly-language subroutines. Its major lack—the ability to handle external data files of any kind—is in keeping with the dearth of suitable disk devices in the Aim 65 catalog. This Basic is fast: 1001 seconds to rattle through our prime number cruncher (IA June 80).

The final firmware fillip is a PL/65 compiler package supplied in 8-kilobytes of ROM for \$125. Space limitations on the circuit card require you to remove the Basic ROMs to make room for those of the PL/65 package. PL/XX-type languages (several microprocessor manufacturers offer their own versions) tend to be used for real-time process control applications.

Top-notch documentation

Someone at Rockwell is putting the emphasis in the right place: the documentation for the Aim 65 is outstanding, assuming you don't depend upon them as primers. Supplied as a set of soft-bound books, the collection includes:

- The *Aim 65 User's Guide*—everything from how to hookup that missing power supply to circuit theory to instruction in operating the monitor, editor and assembler commands.
- The *Aim 65 Basic Language Reference Manual*—one of the best organizations we've seen, with the emphasis on quick reference to once-learned instructions.
- The *R6500 Hardware Manual*—detailed descriptions of the 65XX semiconductor chip family.
- The *R6500 Programming Manual*—how to program the 6502 microprocessor chip in machine language.
- Summary Cards—for Basic, for 6502 instructions and for the Aim 65 itself.

A really stripped-down Aim 65 can be yours for \$425. It includes only one kilobyte of RAM and the 8-kilobyte Monitor ROM, however. Add \$90 for an additional 3 kilobytes of 2114 RAM (or buy them yourself from an electronic parts store). Prices for the supplementary firmware packages are listed above.

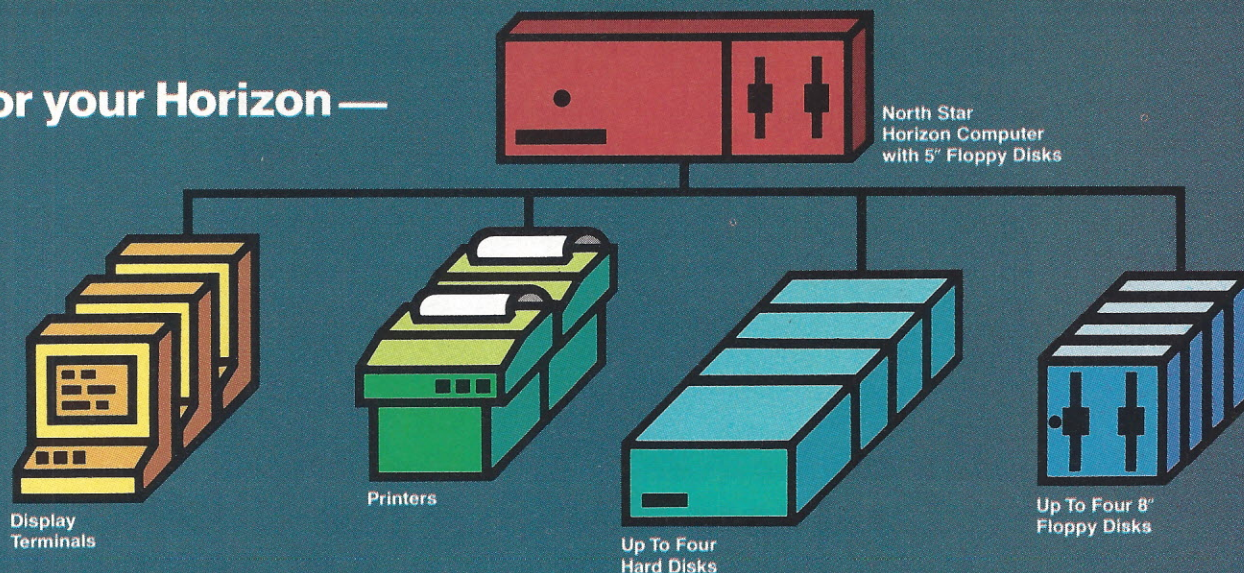
In addition, Rockwell has a growing catalog of accessory items, from expansion motherboards to modems to expensive bubble memory interfaces. Several other manufacturers have jumped on the bandwagon with their own Aim 65 supplements. After the power supply (about \$85), the first thing we'd pop for is a \$45 housing to enclose the vulnerable parts of the naked Aim 65 boards.

Perhaps the greatest cost of owning a machine of this sort is the investment in time required to understand it well enough to make it a useful possession. The Aim 65 is a far cry from being a "turnkey" computer—so far, in fact, you could easily get bogged down in the early days of ownership and abandon it for things more comfortably understood. But stick with it, and you can become one of the few people on this planet who really understands what a computer is all about.

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NAME-ADDRESS AND SORT PROGRAM

by Gary A. Stotts

Name-Address is a program that will store up to 100 names, addresses, and phone numbers. It is written for an Apple micro with one disk drive, and is organized as a binary tree so that names may be entered in any order, but stored alphabetically. More can be added by changing the DIM statements in lines 30-90.

The program will first ask if there is an address file. Next the menu screen prints.

- 1 - Add a name
- 2 - List a name
- 3 - List all names
- 4 - Change a name
- 5 - End

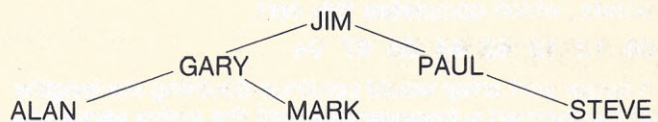
To add or change a name-address record, the required entries are name, street address, city-state-zip and phone number. To list any one address, enter the name. The name must be entered as last name first with no commas. Option 5, 'end', will always create a new name-address file.

The binary tree

A familiar example is the family tree with a person's father and mother as his descendants. Our tree will be based on a person's name. Each name-address record has two link fields. The left link will contain the record address of a name alphabetically lower than the current record; the right link containing the record address of a name alphabetically greater than the current record. Assume the following six names are entered in the order presented: Jim, Paul, Gary, Steve, Mark, Alan. The figure shows the resultant binary tree. All names lower than Jim are to the left and all names greater than Jim are to the right.

Random access into a binary tree consists of comparing the search name to the name read, and if the names are not equal, follow the appropriate link field address to the next record.

Traversing a binary tree in alphabetical order is more complex. First follow all the left links until the left link is zero. Alan is the first name. If there is a right link from Alan take it, if not back up to Gary. Gary is second; if there is a right link take it, if not back up to Jim. Follow Jim's right link. If Paul has a left link, follow left until the left link is zero. Continue this sequence of actions until all records have been read. A stack array is used to hold the address of any record passed over in following the links. Initially the stack would have 1, 1-3, 1-3-6. This is how the program knows to back up to Gary (record 3) after processing Alan (record 6).



Typical binary tree

Sort program

This can sort a random access disk file, the output of which is not a sorted image of the input file, but a list of record addresses specifying the order to read the file in a following program. This technique allows sorting where there is not enough disk space to hold the sorted output file.

The sorting method used is a memory-merge sort, which is easily modified to a disk sort. Multiple ascending sort fields within each record are allowed. There is also a provision to examine each record to determine if it should be included in the sort.

Lines 90, 100, and 140 define the file to be sorted as current hours, with 9 input fields. Record zero contains the total number of records in the file (lines 150, 160). Each record is read. If the first field of the record is not 'A' for active, that record will not be sorted (line 220). The first sort field is field 4, or employee number, which must have a length of 3 (line 240). The other sort fields are only one character long (day number and record type). The relative record address is forced to a length of 3 (line 260).

The record address and sort fields are now combined into one string variable, RK\$ (line 280). Record type will sort within day number within employee number. RK\$ is written to disk.

Sort-in now contains the items to be sorted. These items are read into an array and the sort begins. Each item is sorted on the sort fields alone, the first 3 bytes (record address) just tag along. When the sort is finished, the now sorted array is read, and only the record address is written to a disk file (lines 490, 570, 580).

A following program can read current hours in sorted order by reading the sort-out file. The first sort-out field contains the number of address items, and is used to dimension an array. Each address item is now read into the array. A 'for-next' loop is used to read current hours varying the array index.

```
10 PRINT D$; "READ SORT OUT"
20 INPUT NR
30 DIM ADRES(NR)
40 FOR I = 1 TO NR
```



```

50 INPUT ADRES(I)
60 NEXT I
70 FOR I = 1 to NR
80 PRINT D$: "READ CURRENT HOURS, R"; ADRES(I)

```

The merge sort operates in the following manner. Consider the sequence

44 55 12 42 94 18 06 67

Step 1 is to look at each pair, and if the second element is less than the first element, switch the elements.

44 55 ' 12 42 ' 18 94 ' 06 67

Step 2 merges the ordered pairs two at a time into ordered quadruples.

12 42 44 55 ' 06 18 67 94

Step 3 merges the ordered quadruples into ordered octets, which completes this sort.

06 12 18 42 44 55 67 94

A larger sort array would continue doubling the lengths of the merged subsequences until the entire sequence is ordered.

Modifications

The reason for writing RK\$ to a disk work file rather than entering it directly into the sort array is that the file may be so large that all of the keys cannot be stored in memory. If only a section of the input file is to be included in the sort, only these record keys will be written to disk, and subsequently read into the sort.

If all the records of a very large file are to be sorted, another approach to the sort is taken. Read into the

sort only a portion of the input file. Detach the key and record address for the record, and insert RK\$ directly into the array. When the array is full, sort it and write the sorted output to a disk file.

Continue reading, sorting, and writing different disk files until all input records have been processed. Now merge together all the sort work files into a single output file by examining each work file and taking the entry with the lowest key.

Another merge-sort procedure is to input data and write RK\$ to a work file as long as each succeeding RK\$ is in ascending sequence. When an out of sequence RK\$ is read, check the first work file. If neither of the writing RK\$ to the second work file as long as each RK\$ is in ascending sequence. When an out of sequence RK\$ is read, check the first work file. If neither of the work files can hold RK\$ without going out of sequence, merge the work files together into the first work file and insert the new RK\$ as the first entry in the second work file. The following is an example.

4 5 1 7 8 6 3 2

work 1: 4 5 6

work 2: 1 7 8

1 4 5 6 7 8

work 1: 1 4 5 6 7 8

work 2: 3

1 3 4 5 6 7 8

work 1: 1 3 4 5 6 7 8

work 2: 2

1 2 3 4 5 6 7 8

If the file to be sorted is already partially ordered, the above procedure is very effective. □

Program on Page 140



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OPTIONAL PRINTING WITH CP/M AND MICROSOFT BASIC

by Bruce Haanstra

When running a Basic program, it is often desirable to specify whether the output should go to the console or to the listing device. Some versions of Basic have a function to dynamically assign input and output devices during program execution, so this can easily be done. In Microsoft Basic, however, this can only be done at the expense of having two routines, one using 'print' statements for the console and the other using 'lprint' statements for the printer. What's needed is a method for using one routine to optionally send output to the console or the listing device when running Microsoft Basic with CP/M.

While the CP/M operating system may be compatible from system to system (if it has the same disk format), each CP/M system must be configured to the particular input and output devices in that system. To accomplish this, CP/M has a section called the user area which can be changed to suit the needs of a particular hardware environment. The user area is an assembly language disk file on the CP/M master disk called 'user. asm.' These routines determine which device will be selected when receiving output from the computer or sending input to the computer.

There are four types of supported devices: console, reader, punch and list. Since a system may have more than one given type, a facility is needed to select among them. In CP/M this facility is provided as an I/O byte.

The CP/M I/O byte is an optional feature designed to allow the user to reassign physical and logical I/O

these four devices, one can be coded to send the output to both the printer and the screen, a second can be coded to send the output to the screen only, a third can be coded to send the output to the printer and the fourth can be used for a second printer, if necessary.

Since a Basic 'lprint' statement uses the 'list' jump vector to process its output, using the above scheme allows a wider variety of output options. The options can be selected from Basic using the 'poke' statement.

To implement the I/O byte, it is necessary to make some changes to the user area and then reassemble it. First, the I/O byte must be initialized when the system is turned on. Figure 1 shows an example of a cold start routine which would accomplish this purpose. Any other necessary initialization code could, of course, be placed here before the return instruction is executed. This code assumes that the logical list device is assigned to the physical line printer (LPT:) and that this is the default device. Next, there is a table of jump vectors near the beginning of the user area which direct CP/M

```
;CP/M COLD INITIALIZATION ROUTINE
;
CINITR: LDA    80H      ;INITIALIZE TO LPT: DEVICE
        STA    IOBYTE   ;SET IT INTO THE IOBYTE
        RET
```

Figure 1. Revised bios cold boot routine

devices. This byte is located at address 0003 in memory and is usually described in CP/M manuals. It is set up as a single 8-bit byte having four fields of 2 bits each.

Since the list device has 2 bits of the I/O byte, it can be assigned to any one of four device options. Of

```
;GENERAL LIST DEVICE SELECTION ROUTINE
;
LSTER:  LDA    IOBYTE   ;GET IOBYTE VALUE
        ANI    0C0H     ;STRIP OUT LIST BITS
        CPI    00       ;TELETYPE DEVICE ?
        JPZ    LST0     ;YES
        CPI    40H     ;CRT DEVICE ?
        JPZ    LST1     ;YES
        CPI    80H     ;LINEPRINTER DEVICE ?
        JPZ    LST2     ;YES
        JMP    LST3     ;MUST BE USER DEFINED
```

Figure 2. Printer device processing routine

to the various system dependent routines. The 'list' jump vector here is the item of interest. To accomplish this, the vector should read:

LIST JMP LSTER

'Lster' (see figure 2) is the routine that interprets the 'list' bits of the I/O byte, then jumps to the appropriate routine for the selected device. Finally, the character is output to the selected device or devices. Figures 3 and 4 give two examples of codes that could be used.

Figure 3 illustrates a system with one printer. In this case, the printer is assigned as LST2, the line printer. The console only option is assigned as LST1, the CRT

device. The console and line printer option is assigned as LST0, the teletype device. In LST0, after the character has been sent to the printer, a jump is made to the console output routine. From there, a return state-

```
;SEND OUTPUT TO LINEPRINTER AND CRT
;
LST0: CALL    LST2
      JMP     CONOUT
;
;SEND OUTPUT TO CRT ONLY
;
LST1: JMP     CONOUT
;
;SEND OUTPUT TO LINEPRINTER ONLY (PRTRDV IS LINEPRINTER DRIVER)
;
LST2: JMP     PRTRDV
;
;UNUSED HERE, SO JUST RETURN
;
LST3: RET
```

Figure 3. One-printer system list device allocation

ment is executed, which returns to the calling program. It is assumed here that 'prtrdv' is the software driver routine for the system line printer.

Figure 4 illustrates the system with two printers. LST0 is the CRT and Selectric printer option. When this is selected, the 'list' device output goes to both the screen and the Selectric printer. LST1 is the CRT

```
;SEND TO CRT AND SELECTRIC
;
LST0: CALL    LST3
      JMP     CONOUT
;
;SEND TO CRT AND LINEPRINTER (OR CRT ALONE IF LINEPRINTER OFF)
;
LST1: CALL    LST2
      JMP     CONOUT
;
;SEND TO LINEPRINTER ONLY
;
LST2: JMP     PRTRDV      ;GOTO LINEPRINTER DRIVER ROUTINE
;
;SEND TO SELECTRIC ONLY
;
LST3: JMP     SELDRV      ;GOTO SELECTRIC DRIVER ROUTINE
```

Figure 4. Two-printer system list device allocation

and line printer option. If the line printer is not turned on, this becomes the CRT's only option. This works this way because my line printer is set up as an active low status device, which means that the system will not hang up if characters are sent to it and it is not activated. LST2 is the line printer only option and LST3 is the Selectric only option. 'Seldrv' is the software driver for the Selectric.

When Basic receives an 'lprint' command, it calls on the CP/M 'list' routine in the user area to process the character and send it to the active 'list' device. With the user area altered as described above, it is now possible to use the I/O byte to dynamically select the listing device from a running Basic program.

To use this feature, I put a routine in the Basic program to select the destination for the output (figure 5). This routine can either be at the beginning of the program as illustrated here, or written as a subroutine to be called as needed while the program is running.

It should be noted that if the system locks up when there is output to a printer that is turned off, check to see that the printer is turned on. Any routines that have output which can go to either the printer or the screen

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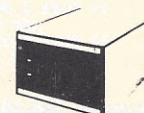
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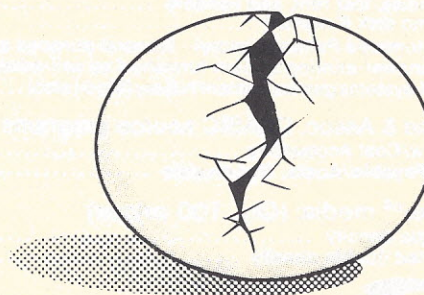
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are then written using 'lprint' statements. Output that should never go to the printer, such as user prompts or error messages, is written using 'print' statements and function in the normal manner. It should be noted that

```
10 PRINT"OUTPUT DEVICES DESIRED (SELECT #)":
  PRINT"1-CRT & SELECTRIC":
  PRINT"2-CRT & LINEPRINTER":
  PRINT"3-LINEPRINTER ONLY":
  PRINT"4-SELECTRIC ONLY":
  INPUT N
20 POKE 3,PEEK(3) AND 63:
  REM CLEAR LIST PART OF I/O BYTE
25 POKE 3,PEEK(3) OR (N-1)*64:
  REM SET IN NEW LIST PART OF I/O BYTE
```

Figure 5. Basic routine to implement optional listings

the 'lprint' command is directed to the same device as the 'lprint' statements.

Along with this selection capability, it is sometimes desirable to be able to select the tabs based on which device the output is going to. In this way, if one has a VDM board or similar display that has 64 character lines, and a printer with 80 or more characters per line, the output can still appear orderly when one device or the other is selected.

Figure 6 illustrates how this might be done after using a selection scheme such as the one in figure 3. Note that when the output selection is for the CRT and a printer, the printer tabs will also be used on the CRT resulting in longer lines than the CRT can handle. The CRT will insert carriage returns at the end of its physical line, which will break up the lines as they appear on the CRT. Also, some versions of Basic may not be able to handle a tab of more than 64.

To understand what these statements are doing, it is necessary to know that in Microsoft Basic, if a logical expression evaluates to 'true', it is assigned a value of -1. If it evaluates to 'false' it is assigned a value of 0. In the routine in figure 6, if the CRT has been selected as the output device, then the expression (N<>2) will evaluate to 'false' (0) and the tab used will be the first number with no offset.

If any other output selection is made (thereby sending output to the printer), the offset value will be

```
100 LPRINTTAB(20-(N<>2)*3) I3;
  TAB(35-(N<>2)*7) A$;
  TAB(45-(N<>2)*12) B$;
  TAB(55-(N<>2)*18) J3
```

Figure 6. Optional tab offset

multiplied by -1 and this amount will be added (as a result of the double negative) to the original tab value to give expanded tabs for the printer.

With the I/O byte so set up, these list device options can be used from CP/M as well as from Basic. The Stat program can change the device selection (e.g., a command line of 'stat lst:=ul1' to send listings to the Selectric printer in a system such as that of figure 4). The Pip program can also be used to send output to the various devices. These possibilities are described in the CP/M manuals.

With these tools, users of CP/M and Microsoft Basic have the ability to dynamically assign the 'list' device for optional output to the printer or the CRT in the many applications where this is desirable. □

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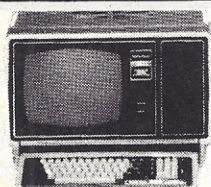


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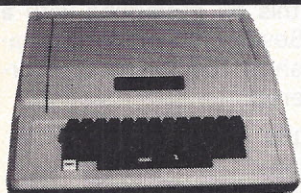
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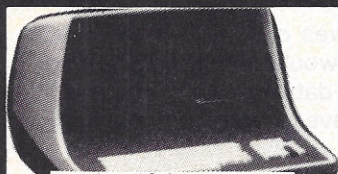
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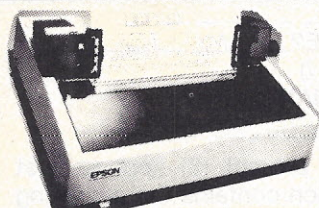
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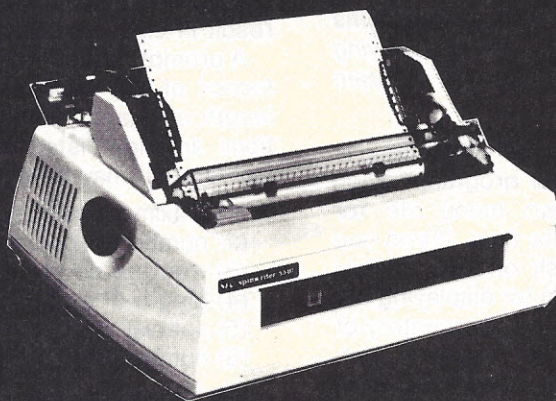


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IMPROVING YOUR CONSOLE INPUT

by Hugh Poynor

Part II

Poynor continues his discussion on the various methods of writing programs to ensure convenient user input and screen formatting on the video console. Programmers are shown how to utilize computer programs to present stored variables as job parameters, relying on a minimum amount of information from the program user about these parameters.

The practice of documenting libraries with menus is a helpful way of keeping up with your programs. Each disk or tape should have its own menu file for documentation of programs and data files. When you want to see the contents of a disk or tape, simply mount the media and run the program for displaying the menu. Documentation should organize the inventory of programs into categories (games, text input/edit, output compilers, statistics, utilities, etc.) and should have a one-sentence description of each program or data file. If you work operating systems that allow linked load-and-go, the menu can run selected programs. In these cases, be sure to end all programs with a link back to the menu program to tie the system together.

When asking for console input to fit within a particular size record or field length, it is useful to notify the user how large or small it is. In some cases, such as with name tags, address labels or headings, the appearance can be improved by composing the input in a pleasing format at the time it is input. For this, fields must be presented in a format with the approximate dimensions specified for the final product. In other words, anticipate the final format when asking for input.

Prompting provides protection

In this final console input principle, there are two classes of formats to be addressed: value formats (numeric or string) and appearance formats (field size and esthetics). Both require specialized prompting techniques that exercise the power of video screens. Prompting should channel or control users to do the "right thing" in a particular situation and provide some protection against wrong input.

Unfortunately, many programmers fail to thoroughly check input values, and this will always result in problems to the user. This is especially true when updating files by taking console input and writing it out to transaction files, payroll files or inventory files. These problems are never encountered until the file is employed in a subsequent job, when discovery of the data error results, for example, in a wrong balance (many times going undetected) or a wrong paycheck (never undetected). Worse than these, perhaps, is an operating system error message produced by the bad data. In this case, it is often quite tedious even for programmers to figure out the problem; it is probably im-

possible for users. To summarize, unchecked input is the mark of bad programming.

Prompting does not check the input data, of course, but as we will see it greatly alleviates input data errors and, when combined with subsequent checks, may result in error-free input.

A prompt requesting input should clearly suggest the format of the value and do this by prompting with a length or quantity indicator. Several format considerations are now listed which show the range of alternatives that may be encountered.

- (1) maximum number of digits
- (2) number of decimal places
- (3) whether decimals are permitted
- (4) length of string fields
- (5) special delimiting characters
- (6) number of items

Several of these alternatives can be illustrated with console prompts as they would appear to a user. These requests for various data items correspond to the list of considerations above (where the cursor position is represented by ?).

- (1) PLEASE ENTER YOUR ACCT. NO.? _ _ _ _ _
- (2) PLEASE ENTER THE AMOUNT? \$ _ _ _ _ _
- (3) ENTER COEFFICIENT FOR VARIABLE
3? _ _ _ _ _
- (4) ENTER PART NAME? _ _ _ _ _
- (5) ENTER TODAY'S DATE? _ _ / _ _ / _ _
(DON'T FORGET THE /)
- (6) ENTER PART NO., QUANTITY
ORDERED? _ _ _ _ _

For these examples, the prompt (?) appears just before the input location which contains the delimiting format. In this way the user keys input over the delimiting format so it serves to guide his entire response.

Programming this useful prompting technique in Basic is quite simple, and can even be accomplished with several alternative algorithms. One sequence used for obtaining today's date from the user is listed below:

- (1) Clear screen and home cursor
- (2) PRINT TAB (21); " _ _ / _ _ / _ _
(DON'T FORGET THE /)"
- (3) Home cursor
- (4) INPUT "ENTER TODAY'S DATE"; D\$
- (5) Check response and loop to (1) if needed.

Particular codes are required for clearing screens and homing the cursor, as mentioned earlier, and should be employed in steps 1 and 3. Step 5 indicates the checking procedure, which consists of checking the length and seeking two slashes. Beyond step 5, the program can further check for acceptance by employing the user in a final validity test:

- (6) Clear screen and home cursor

- (7) PRINT "TODAY'S DATE IS"; D\$
- (8) INPUT "OKAY TO PROCEED (Y/N)"; I\$
- (9) Check response and loop to (1) if needed.

In another version of this user test, it may be useful to employ a day-of-the-week routine that finds which day corresponds to a particular calendar date. The name of the day is then printed beside the date in step 7 and provides further reference for the user.

Similarly, validity testing should be programmed for many inputs such as account numbers, product codes, etc. Simply perform a table look-up or read a particular record to obtain corroborating information such as the name of the person holding the account for which the number is given, or the name of the product for which the code is given. This information is printed on the console screen in order to gain user confirmation.

Both control of field size and control of esthetics are topics in this discussion. Prompting will highlight the final format for data items such as mailing labels, name tags, headings and other material where appearance is important.

Displaying mailing labels

Briefly, the procedure is to provide an elaborate prompt as a simulation of the final output. A mailing label, for example, might be physically limited to a 2-inch by 4-inch piece of adhesive paper. The prompt should put these dimensions onto the screen, along with the delimiting prompts for certain field sizes in the address. A user inputting the address can visualize the final product and make corresponding format decisions.

The final printed form of a mailing label is printed on the cleared screen as a box shape using minus characters and periods. Next, a series of lines gathers user input within this box outline, while the user governs suitable spacing during the input process.

With regard to extensive screen printing, it is preferable to employ top-down printing that stops when the screen is full, moves only one line at a time, and gives a natural left-to-right and top-to-bottom page effect for easy reading. Requesting input from users should be by asking explicit questions and, when possible, by using standardized terms and formats; always ask for natural-language (not code) responses and check input consistently. Displays in standard screen locations help focus the user's attention, so ask for input in the uppermost location of a clear screen, or display status information and options below the input request.

Show the user as complete a picture as possible of the alternatives available as job parameters. Allow alternatives to be frequently and easily changed. Use menus for documentation of programs and data libraries. Prompting aids in understanding the requested input data and prevents data errors. Prompts are most effective when they use explicit language and contain specific delimiting format guidance. Elaborate prompts may take the shape of special printer forms, to enlist the user to input data that results in a pleasing appearance.

Several programs and subroutines in Basic have been prepared to help in getting started with console input principles. The routines are written and tested with a variety of inputs thought to be as realistic as possible.

This was done in a CP/M environment with a CBasic compiler on a Digital Systems DSC-2. CBasic does not require statement numbers except for branching—a tremendous advantage in programming and in making

programs easy to read. However, it makes programming for other Basics somewhat speculative since statement numbers are required in those cases and cannot be checked by the CBasic compiler. Therefore, careful proofreading, rather than testing, was used to check sequential statement numbers.

Two versions of a top-down printing program are first presented. In one version, written in unstructured Basic, statement numbers are used; the second version is virtually free of line numbers and is written in structured Basic.

Next, a very simple routine illustrates checking for yes-no answers and recoding the response to a numeric value for easy use at a later point in a 'goto' statement. The next routine builds an input guideline (value format) in the form of a tailored prompt field into which the user enters a response of specified length.

The next two routines simply print messages inside centered boxes. They illustrate how to put the cursor in specific screen locations as might be needed for displaying menus. The final subroutine lists screen-manipulation codes for three popular makes of consoles: ADDS, ADM and Hazeltine.

With the exception of the brief yes-no processor, each subroutine requires the execution of 'gosub 8700' at some point before its use simply to establish the particular screen-manipulation codes needed. The top-down printing programs explicitly perform a 'gosub 8700', but the subroutines require that you do this at some point prior to their use, preferably as the first executable step in any program and, of course, only once.

Variables are named 'Pn\$' in most of the subroutines. You must observe these names as already used, and not employ them for other values. In other words, these variable names are reserved. Still other variable names may be reused in any way; however their contents will be altered by the routines. These are R, I, C, K, L and Q1. Messages and prompts sent to the subroutines are in the variables names Q2\$, Q1\$ (Q1) and Q1\$. But since these are variables being 'sent', their names may be used elsewhere without causing conflict.

Copy the routines

When initially keying-in the routines, it is suggested that you make a copy to avoid alterations at the copying stage. This will aid accuracy and make proofreading more straightforward. After an accurate copy is made, make any alterations to suit the Basic you are using. As an extra precaution, do not alter variable names until you have demonstrated that the routines perform properly.

These are main programs, not subroutines. When using them, the code at 8700 through 8845 should be in core.

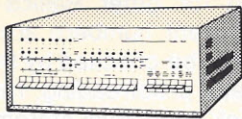
The programs present a prompt in the uppermost position of a clear screen and ask for the drive and file name, the contents of which are to be printed. By pressing the 'return' key, the programs stop; otherwise they print the file name about to be opened and printed. Pressing 'return' again, opens the file, clears the screen and lists the file in top-down fashion. After reading and printing 23 records or lines (which ever is larger), the programs halt, allowing you to read the screen. Simply press 'return' to continue looking at the file one screen at a time. You will be informed when the end of the file is reached.

Both versions run efficiently and it is impossible to distinguish which is being used. Structured Basic has

BITS

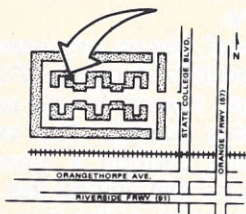
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to be written from the inside loop (printing the file) outward, however, and requires using efficient programming for ending loops and for overall organization of tasks. The two 'while forever' loops control the opening of an infinite number of files, and filling an infinite number of screens. In the unstructured Basic version, these two loops are enabled with a 'go to 16' and a 'go to 55', respectively.

Other versions may be written by modifying those listed. Note that a comma in the middle of a disk record may signal in Basic that multiple records are present. In such cases, the programs will print more than one line per disk record. Another version might list a specific file with known record lengths in a tailored format rather than the stored (disk) format to enhance readability of the records' contents. Another modification could be made to list matrices rather than files.

Program 1. Top-down printing program using statement numbers.

```

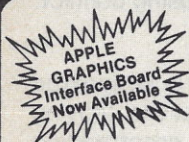
1 REM
2 REM
10 GOSUB 8700
12 Q3$ = "PRESS RETURN"
16 PRINT P3$; TAB(23); "-:-----"
20 PRINT P2$;
22 INPUT "ENTER DRIVE:FILE"; LINE F$
26 IF LEN(F$) = 0 THEN STOP
30 PRINT "FILE IS "; F$; ", "; Q3$;
35 INPUT LINE IS
40 IF END #3 THEN 120
45 OPEN F$ AS 3
50 IF END #3 THEN 110
55 PRINT P3$;
60 L = 0

```

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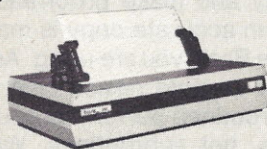
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```

65 READ #3; A$
70 S = INT(LEN(A$)/80) + 1
75 L = L + S
80 PRINT A$
85 IF L >= 23 THEN 100
95 GO TO 65
100 PRINT Q3$;
102 INPUT LINE I$
106 GO TO 55
110 CLOSE 3
120 INPUT "END OF FILE READ, PRESS RETURN?"; LINE I$
125 GO TO 16
130 END

```

Program 2. Top-down printing program using unstructured Basic.

```

REM
REM
GOSUB 8700
Q3$ = "PRESS RETURN"
FOREVER = -1
WHILE FOREVER
  PRINT P3$; TAB(23); "-:-----"
  PRINT P2$;
  INPUT "ENTER DRIVE:FILE"; LINE F$
  IF LEN(F$) = 0 THEN STOP
  PRINT "FILE IS "; F$; ", "; Q3$;
  INPUT LINE I$
  IF END #3 THEN 120
  OPEN F$ AS 3
  IF END #3 THEN 110
  WHILE FOREVER
    PRINT P3$;
    L = 0
    WHILE L < 23
      READ #3; A$
      S = INT(LEN(A$)/80) + 1
      L = L + S
      PRINT A$
    WEND
    PRINT Q3$;
    INPUT LINE I$
  WEND
110 CLOSE 3
120 INPUT "END OF FILE READ, PRESS RETURN?"; LINE I$
WEND
END

```

Checking yes-no answers: This simple routine checks a user response for either yes or no by examining only the left-most character of the users input, and returns Q3 as the signal for what was found in the first byte of that input response. The values of Q3 are:

- 0 = None of the characters YyNn were found as the first byte
- 1 = Y or y was found as the first byte
- 2 = N or n was found as the first byte

Depending on what you wish to do with this information, you can efficiently use a computed 'goto' with the variable Q3. The zero branch might repeat the question, the yes branch might initiate a process, and the no branch might ask for other responses.

Program 3. Simple routine checking for yes-no responses.

```

8970 REM
8971 REM
8980 Q1$ = LEFT$ (Q1$,1)
8982 Q3 = 1
8984 IF Q1$ = "Y" OR Q1$ = "Y" THEN RETURN
8986 Q3 = 2
8988 IF Q1$ = "N" OR Q1$ = "N" THEN RETURN
8980 Q3 = 0
8982 RETURN

```

General purpose prompt: Before using this routine, execute 'gosub 8700'. A series of dashes is written as the guideline to follow when inputting responses. Only

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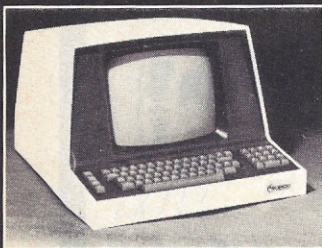
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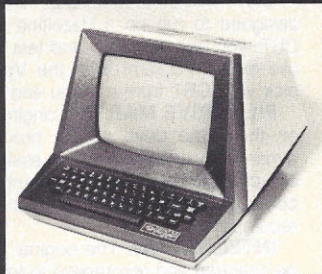
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the specified number of dashes is printed; the last one is followed by a slash in order to delimit the size of the response. To use the routine, send Q2 as the size of the response, send Q1\$ as the prompt and receive Q2\$ as the response. Generally, you will clear the screen before using the routine simply by printing P3\$.

Program 4. Simple routine for building an input guideline.

```
8900 REM
8901 REM
8910 PRINT TAB(LEN(Q1$)+3);
8915 FOR I = 1 TO Q2
8920 PRINT "-";
8925 NEXT I
8930 PRINT "/"
8935 PRINT P6$;
8940 PRINT Q1$;
8945 INPUT "?"; LINE Q2$
8950 IF LEN(Q2$) <= Q2 THEN RETURN
8955 PRINT "** IMPROPER LENGTH, RE-ENTER ABOVE **";
P6$; P6$;
8960 GO TO 8910
```

Message in a box: Two routines are presented to do the same thing:—in one case for a single-message line and in another for multiple-message lines. Even though the latter program is all that is needed to do this, it is too complicated to use in demonstrating how to powerfully exploit screen manipulation codes.

The output is a box made of * characters centered in the screen and containing a message. It is quite useful in gaining attention, delivering warnings, or simply in having neat looking output.

Use of the routine must be preceded by 'gosub 8700'. In the one-line case, send a message in Q2\$ of up to 60 bytes in length. Q2\$ will be centered and printed with a box surrounding it. The cursor will be homed and control returned to the user.

To allow for a variety of cursor positioning codes among the different consoles, the variable P1 is included freely rather than using constants. Generality of the program is more important than any small advantage in execution speed gained with constants. Because of P1, the cursor will appear on the ADDS, ADM and Hazeltine screens at the same desired position. The variables R and C are computed rather than established as constants to indicate how the 24 by 80 screen locations are referenced to find the screens center.

Program 5. Two routines illustrate how to put the cursor in specific screen locations.

```
9000 REM
9001 REM
9010 PRINT P3$;
9015 Q2$ = LEFT$(Q2$,60)
9020 Q1 = LEN(Q2$) + 4
9025 R = 12 - 4
9030 C = 40 - Q1/2
9035 PRINT P1$ + CHR$(P1+R) + CHR$(P1+C);
9040 FOR I = 1 TO Q1+2
9045 PRINT "**";
9050 NEXT I
9055 FOR K = 1 TO 5
9060 PRINT P1$ + CHR$(P1+R+K) + CHR$(P1+C); "**";
9065 IF K = 3 THEN PRINT " "; Q2$;
9070 PRINT P1$ + CHR$(P1+R+K) + CHR$(P1+C+Q1+1); "**"
9075 NEXT K
9080 PRINT P1$ + CHR$(P1+R+6) + CHR$(P1+C);
9085 FOR I = 1 TO Q1+2
9090 PRINT "**";
9095 NEXT I
9096 PRINT P2$
9098 RETURN
9100 REM
9101 REM
```



```

9110 PRINT P3$;
9111 Q1 = 0
9112 FOR I = 1 TO Q2
9113 IF LEN(Q1$(I)) > Q1 THEN Q1 = LEN(Q1$(I)) + 4
9115 Q1$(I) = LEFT$(Q1$(I), 60)
9120 NEXT I
9125 R = 14 - (Q2 + 2)
9130 C = 40 - Q1/2
9135 PRINT P1$ + CHR$(P1+R) + CHR$(P1+C);
9140 FOR I = 1 TO Q1+2
9145 PRINT "**";
9150 NEXT I
9152 L = 1
9155 FOR K = 1 TO 4
9160 PRINT P1$ + CHR$(P1+R+L) + CHR$(P1+C); "**";
9161 PRINT P1$ + CHR$(P1+R+L) + CHR$(P1+C+Q1+1); "*"
9162 L = L + 1
9163 IF K <> 2 THEN Q175
9164 FOR I = 1 TO Q2
9166 PRINT P1$ + CHR$(P1+R+L) + CHR$(P1+C); "**";
9167 PRINT P1$ + CHR$(P1+R+L) +
CHR$(P1+41-LEN(Q1$(I))/2); Q1$(I);
9168 PRINT P1$ + CHR$(P1+R+L); CHR$(P1+C+Q1+1); "*"
9169 L = L + 1
9170 NEXT I
9175 NEXT K
9180 PRINT P1$ + CHR$(P1+R+5+Q2) + CHR$(P1+C);
9185 FOR I = 1 TO Q1+2
9191 PRINT "**";
9195 NEXT I
9196 PRINT P2$
9198 RETURN

```

Program 6. Screen-manipulation codes for three different consoles.

```

8690 REM
8700 GO TO 8705
8701 REM
8702 REM
8703 REM ***** ADDS CONSOLES *****
8704 REM
8705 P1$ = CHR$(27) + CHR$(89) :REM PUT CURSOR AT...
8706 P1 = 31 :REM ADJ. PUT LOCATOR
8710 P2$ = P1$ + CHR$(P1+1) + CHR$(P1+1) :REM HOME THE CURSOR
8715 P3$ = P2$ + CHR$(12) :REM CLEAR SCREEN, HOME.
8720 P4$ = CHR$(6) :REM FORESPACE
8725 P5$ = CHR$(21) :REM BACKSPACE
8730 P6$ = CHR$(26) :REM UPWARD
8735 P7$ = CHR$(10) :REM DOWNWARD
8740 RETURN
8750 REM
8751 REM ***** ADM CONSOLES *****
8752 REM
8755 P1$ = CHR$(27) + CHR$(61) :REM PUT CURSOR AT...
8756 P1 = 31 :REM ADJ. PUT LOCATOR
8760 P2$ = P1$ + CHR$(P1+1) + CHR$(P1+1) :REM HOME THE CURSOR
8765 P3$ = P2$ + CHR$(27) + CHR$(58) :REM CLEAR SCREEN, HOME
8770 P4$ = CHR$(12) :REM FORESPACE
8775 P5$ = CHR$(8) :REM BACKSPACE
8780 P6$ = CHR$(11) :REM UPWARD
8785 P7$ = CHR$(10) :REM DOWNWARD
8790 RETURN
8800 REM
8801 REM ***** HAZELTINE CONSOLES *****
8802 REM
8805 P1$ = CHR$(17) :REM PUT CURSOR AT...
8806 P1 = 0 :REM ADJ. PUT LOCATOR
8810 P2$ = P1$ + CHR$(P1+1) + CHR$(P1+1) :REM HOME THE CURSOR
8815 P3$ = P2$ + CHR$(28) :REM CLEAR SCREEN, HOME
8820 P4$ = CHR$(16) :REM FORESPACE
8825 P5$ = CHR$(8) :REM BACKSPACE
8830 P6$ = CHR$(12) :REM UPWARD
8835 P7$ = CHR$(11) :REM DOWNWARD
8840 RETURN

```

Screen-manipulation codes: All will run equally well on any of the three consoles for which codes are provided. Other consoles can and should be added to make it more generally useful.

To use the desired set of codes, simply alter the statement number located at 8700. As it's written, it points to the ADDS console (8705) but could be easily altered to point to the ADM (8755) or Hazeltine (8805). It is recommended that only the 8700 statement be altered, and not the calling programs.

By making the change at 8700, all calling programs are automatically provided with the desired code set. Conversely, if all the calling programs must point to the particular statements associated with particular code sets, each program must be changed whenever consoles are changed. Obviously, it is better to make one change than many in order to adjust your programs to another brand of console. □

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☐ **FREE CATALOG:** All programs are supplied in disc and run on Apple II w/Disc & Applesoft ROM Card & TRS-80 Level II and require 32K RAM unless otherwise noted. Detailed instructions included. Orders shipped within 3 days. Card users include card number. Add \$1.50 postage and handling with each order.

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CP/M for the TRS-80 Model II: Lifeboat and FMG Corp. Versions

by Alan R. Miller

The TRS-80 model II computer is different from the original TRS-80 model I. About the only thing the two have in common is the Z-80 microprocessor. The model II keyboard is nearly identical to the usual computer console keyboard. There is a shift key, a shift-lock key, and upper-case lock, a control key, a backspace (control-H) key, and a tab (control-I) key. The carriage return key is 'enter'.

For some strange reason, there is no 'del' or 'rubout' key. There are four cursor-positioning keys labeled with arrows pointing left, right, up and down. However, these keys don't generate the usual control-H, control-J, control-K, and control-L codes. Instead, they generate four other control codes. There is no separate line-feed key, although a line feed can be obtained by typing a control-J.

The video screen is a true serial device rather than a memory-mapped screen. It has an addressable-cursor feature as well as full graphics capabilities. Another useful feature is a high-speed, bidirectional printer with full handshaking. The printer accepts tractor-feed forms up to 14 inches wide and can print 132 characters per line.

Up to four, double-density, 8-inch floppy disks can be added. This provides 2 megabytes of disk space. A Corvus, 10-megabyte hard disk is also available. Other accessories, such as a telephone modem, can be connected to one of the two serial ports. The complete Z-80 computer with 64K bytes of memory, a keyboard, a printer, and one 8-inch floppy disk costs about \$6,000. Three additional floppy disks cost \$2,350.

Version 2.2 corrects some of the bugs in version 2.0. It is available from Lifeboat Assoc., 2248 Broadway, NY, NY 10024, and from FMG Corp., 5280 Trail Lake Dr., Ft. Worth, TX 76133. The two packages are similar, but have slightly different features. Since the TRS-80 model II is available with either 32K or 64K bytes of memory, the actual memory size should be specified when these CP/M packages are ordered. The smaller size can be easily enlarged by use of the 'movcpm' program supplied with CP/M.

Both of these packages are ready to run; they couldn't be easier to use. The computer is turned on

and the CP/M diskette is inserted into the primary drive. When the disk door is closed, CP/M automatically starts up. No fuss, no muss.

CP/M is initially configured for multiple drives. But, if there is only one disk drive, you can reconfigure CP/M for a single-drive system. If you have more than one drive, make a backup copy of CP/M by executing the program Copy for the Lifeboat version or the program Copyfile for the FMG version.

If you have only one disk drive, give the command:

A>ONEDRIVE

This program will temporarily configure CP/M so that the four logical drives A, B, C, and D will access the one physical drive.

The next step is to make a backup copy of the original CP/M diskette using the program Copy. The system tracks, not normally accessible to the user, are copied at this time. If there is only one physical drive, the process is straightforward but tedious.

Five tracks are copied into memory from the original diskette, which is removed and the new diskette inserted. After 'enter' is pressed, the five tracks are copied from memory to the new diskette. Since there are 77 tracks on an 8-inch diskette, the process must be repeated 16 times.

At the conclusion, the program asks whether the process is to be repeated or terminated. Terminate with an E (for exit). The new diskette is now used as the system disk.

The system tracks of the new diskette are altered next so that a one-drive system is automatically selected on a cold start. The Onedrive program will not have to be run each time the computer is started up. Give the command:

A>CONFIG

A detailed set of instructions allows the user to set options for all the peripherals including the disks. One of these is used to set the one-drive configuration. The last step in the Config program asks whether the alterations are to be written onto the diskette, and whether a warm or cold start is desired. Choose the option that writes the new configuration to the disk and performs a cold start. Now, each time that CP/M is started up, it will automatically be configured for one physical drive. If another disk is added later, the Config program can

be rerun so that the system can be reconfigured for multiple drives.

While the FMG version is normally distributed in multidisk, it can be ordered for a one-disk system. However, the multidisk version can be used on a one-drive system. Give the command:

A>DRIVE ONE

Be sure that the write-protect notch is covered with a piece of tape before giving this command. The program Backup can then be run to make a backup copy of the original diskette.

The standard, single-density disk format contains 128 bytes of data in each sector, allowing 250K bytes of program storage per diskette in addition to the operating system and directory. The regular, double-density format uses 256-byte sectors, providing about 500K bytes. The Lifeboat version also has an extended-density format with nearly 600K bytes.

With Lifeboat, either double-density or extended-density diskette must reside in logical drive A. Any of the three formats may be used in the other logical drives. The system will automatically determine the density of the diskette in each drive when the directory is read. If you want to change the density, perform a warm start with a control-C command. This will cause a rereading of the disk directory.

CP/M software is usually supplied on single-density diskettes. The utility program PIP can be used to copy such software from the original diskette to a working diskette. Suppose that the system diskette is on logical drive A, the working diskette is on drive B, and the source diskette is in drive C. Go to drive B with the command:

A>B:

Load PIP from drive A and command it to copy the new program from C to B. For example, ZSID can be copied from drive C to drive B with the command:

B>A:PIP B:=C:ZSID.COM[V]

If there is only one drive, and the system has been configured for one drive, the user will be prompted to change diskettes at the proper time. Actually, if there is only one drive, it is easier to have a copy of PIP on each diskette. Otherwise, there will be a lot of interchanging between diskettes.

Direct cursor addressing

The video terminal on the TRS-80 model II uses an addressable cursor, although it is a serially-connected device. This means that screen-oriented text editors such as Word Master (IA Jan 80) and Magic Wand can be utilized. These unique programs make an ordinary serial video terminal emulate a memory-mapped video screen.

Commands can be given to move the cursor anywhere on the video screen. Text can be scrolled forward or backward. A line can be split in two by inserting a carriage-return, line-feed pair in the middle. Alternately, two adjacent lines can be joined into one by deleting the carriage-return, line-feed pair between them.

One mode of the Magic Wand editor automatically formats the text on the video screen. The user indicates the ends of paragraphs rather than the ends of lines. Other programs such as Word-Star and versions of Cobol and Pascal also utilize direct cursor addressing.

If you want to write a system monitor in assembly language that performs direct console input and output, it might be easiest to use the CP/M BIOS routines.

The address can be obtained from the warm-start address 'wstart' at location 1:

	JMP	WSTART	
...			
WSTART:	JMP	WBOOT	; warm boot
+ 3	JMP	CONST	; console status
+ 6	JMP	CONIN	; console input
+ 9	JMP	CONOUT	; console output
+ 12	JMP	LIST	; output

Console input is obtained by calling the address of 'wstart' plus 6. The byte is returned in the accumulator. Console output is performed by placing the C register and calling 'wstart' plus 9. List output is at 'wstart' plus 12. Listing 1 demonstrates how to perform direct console input and output using the CP/M BIOS. The program, designed to run at 100 hex, will work with any CP/M system.

Inputting commands

When the program is assembled and loaded, it is started by branching to the address of 100 hex. A prompt of '/' is displayed. Letters, numbers, carriage return, line feed can now be entered from the keyboard. These characters are echoed on the console as they are typed. Type a control-D and the prompt character will appear on a new line. Finally, type a control-C and control will return to CP/M at address zero.

The input routine 'inputt' obtains the warm-start address from location 1. The value of 6 is added to set the BIOS console input address. A subroutine call is then made to this address. The return address 'out3' is placed onto the stack with a 'push H' command. The call address, which is in HL, is placed into the program counter with a 'pchl' operation. For both the input and output routine, the general-purpose registers are saved on the stack.

The TRS-80 model II provides a parallel port for the line printer and another for external disks. There are also two RS-232 serial ports. One can be connected to a tape reader or punch. The other can be used for a telephone modem. In this case, however, there may be a slight hardware problem. The serial ports of the model II and the phone modem are configured the same way. Therefore an adapter plug that can interchange the transmit and receive lines will have to be made.

Line 2 from the computer must go to pin 3 of the modem and line 3 from the computer must go to pin 2 of the modem. The handshake lines will also have to be interchanged. Pin 4 of each unit goes to pin 5 of the other unit. Also pin 8 of each is connected to both pins 6 and 20 of the other. With the adapter plug, the model II can be connected to another computer or a remote computer terminal over a telephone line.

RS232 pin connections

TRS80		Modem
1	-----	1
2	-----	3
3	-----	2
4	-----	5
5	-----	4
20/6	-----	8
7	-----	7
8	-----	6/20

Both FMG and Lifeboat contain software for configuring the serial ports. Several features must be

Prices reflect distribution on 5 1/4 single density diskettes. If a format is requested which requires additional diskettes, a surcharge of \$8 per additional diskette will be added. A surcharge of \$25 will be added for software on CSII format (CC 300M, cartridge). Media charge for 5440 disk is \$100.

Software with Manual / Manual Alone

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All Lifeboat programs require CP/M, unless otherwise stated.
Software for most popular 8080/Z80 computer disk systems

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CP/M* FLOPPY DISK OPERATING SYSTEM—Digital Research's operating system configured for many popular micro-computers and disk systems.

System	Version	Price
Apple II*	2.x	\$350/25
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Microsoft BASIC version 5		
with high resolution graphics		
North Star Single Density	1.4	\$145/25
North Star Double Density	1.4	\$145/25
North Star Single Density	2.x	\$170/25
North Star Double/Quad	2.x	\$170/25
Durango F-85	2.x	\$170/25
ICOM Micro-Disk 2411	1.4	\$145/25
ICOM 3712	1.4	\$170/25
ICOM 3812	1.4	\$170/25
Mits 3202/Altair 8800	1.4	\$145/25
Heath H8 + H17	1.4	\$145/25
Heath H89	1.4	\$145/25
Heath H89 by Magnolia	1.4	\$250/25
Heath H89 by Magnolia	2.x	\$300/25
Onyx C8001	2.x	\$300/25
Ohio Scientific C3	2.x	\$200/25
TRS-80 Model I	1.4	\$145/25
TRS-80 Model II	2.x	\$170/25
TRS-80 Model II - Corvus	2.x	\$250/25
Processor Technology		
Helios II	1.4	\$145/25
Cromemco System 3	1.4	\$145/25
Intel MDS Single Density	1.4	\$145/25
Intel MDS Single Density	2.x	\$170/25
Micropolis Mod I	1.4	\$145/25
Micropolis Mod II	1.4	\$145/25

The following configurations are scheduled for release soon:

North Star Double/Quad		
Corvus	2.x	\$250/25
North Star Horizon HD-1	2.x	\$250/25
Ohio Scientific C3-C	2.x	\$250/25
Micropolis Mod II	2.x	\$200/25
Mostek MDX STD		
Bus System	2.x	\$350/25**
ICOM 3812	2.x	\$225/25*
ICOM 4511/Petec D3000	2.x	\$375/25**

Software consists of the operating system, text editor, assembler, debugger and other utilities for file management and system maintenance. Complete set of Digital Research's documentation and additional implementation notes included. Systems marked * and ** include firmware on 2708 and 2716. Systems marked + include 5440 media charge. Systems marked @ require the special @ versions of software in this catalog. Systems marked @ have minor variants available to suit console interface of system. Call or write for full list of options. @ includes hardware addition to allow our standard versions of software to run under it.

Z80 DEVELOPMENT PACKAGE—Consists of: (1) disk file line editor, with global inter and intra-line facilities; (2) Z80 relocating assembler, Zilog/Mostek mnemonics, conditional assembly and cross reference table capabilities; (3) linking loader producing absolute Intel hex disk file. \$95/\$20

ZDT—Z80 Monitor Debugger to break and examine registers with standard Zilog/Mostek mnemonic disassembly displays. \$35 when ordered with Z80 Development Package. \$50/\$10

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BUG* and **μBUG***—Z80 interactive machine level debugging tools for program development. BUG has full symbolic trace and interactive assembly (mnemonics compatible with PASM). Dynamic breakpoints and conditional traps while tracing (even through ROM). μBUG is a subset of BUG and is used in memory limited situations. \$129/\$25

DIGITAL RESEARCH

MP/M—Installed for single density MDS-800. Multi-processing derivative of the CP/M operating system. Manual includes CP/M2 documentation. \$300/\$50

MAC-8080—Macro assembler. Full Intel macro definitions. Pseudo Ops include RPC, IRP, REPT, TITLE, PAGE, and MACLIB. Produces absolute hex output plus symbol table file for use by SID and ZSID (see below) \$120/\$15

SID-8080—Symbolic debugger. Full trace, pass count and breakpoint program testing. Has backtrace and histogram utilities. When used with MAC, provides full symbolic display of memory labels and equated values. \$105/\$15

ZSID-Z80—Symbolic debugger with all features of SID. \$130/\$15

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DESPOOL—Utility program to permit simultaneous printing from text files while executing other programs. \$80/\$10

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BDS C COMPILER—Supports most features of language, including Structures, Arrays, Pointers, recursive function evaluation, overlays. Includes linking loader, library manager, and library containing general purpose, file I/O, and floating point functions. Lacks initializers, statics, floats and longs. Documentation includes "The C PROGRAMMING LANGUAGE" by Kernighan and Ritchie. \$145/\$25

WHITESMITHS C COMPILER—The ultimate in systems software tools. Produces faster code than a pseudo-code Pascal with more extensive facilities. Conforms to the full UNIX* Version 7 C language, described by Kernighan and Ritchie, and makes available over 75 functions for performing I/O, string manipulation and storage allocation. Linkable to Microsoft REL files. Requires 60K CP/M. \$630/\$30

MICROSOFT

BASIC-80—Disk Extended BASIC, ANSI compatible with long variable names, WHILE/WEND, chaining, variable length file records. \$325/\$25

BASIC COMPILER—Language compatible with BASIC-80 and 3-10 times faster execution. Produces standard Microsoft relocatable binary output. Includes MACRO-80. Also linkable to FORTRAN-80 or COBOL-80 code modules. \$350/\$25

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μLISP-79—Microcomputer implementation of LISP. The interpreter resides in only 7K bytes of memory yet includes 83 LISP functions. Has infinite precision integer arithmetic expressed in any radix from 2 to 36. μLISP-79 includes complete trace facility and a library of useful functions and entertaining sample programs. \$200/\$15

XMACRO-86—8086 cross assembler. All Macro and utility features of MACRO-80 package. Mnemonics slightly modified from Intel ASM86. Compatibility data sheet available. \$275/\$25

EDIT-80—Very fast random access text editor for text with or without line numbers. Global and intra-line commands supported. File compare utility included. \$89/\$15

PASCAL/M*—Compiles enhanced Standard Pascal to compressed efficient Pcode. Totally CP/M compatible. Random access files. Both 16 and 32-bit integers. Runtime error recovery. Convenient STRINGS. OTHERWISE clause on CASE. Comprehensive manual (90 pp. indexed). SEGMENT provides overlay structure. IMPORT, OUTPUT and untyped files for arbitrary I/O. Requires 56K CP/M. Specify 1) 8080 CP/M, 2) Z80 CP/M, or 3) Cromemco CDOS. \$175/\$20

PASCAL/Z—Z80 native code PASCAL compiler. Produces optimized, ROMable re-entrant code. All interfacing to CP/M is through the support library. The package includes compiler, relocating assembler and linker, and source for all library modules. Variant records, strings and direct I/O are supported. Requires 56K CP/M. \$395/\$25

PASCAL/MT—Subset of standard PASCAL. Generates ROMable 8080 machine code. Symbolic debugger included. Supports interrupt procedures, CP/M file I/O and assembly language interface. Real variables can be BCD, software floating point, or AMD 9511 hardware floating point. Includes strings enumerations and record data types. Manual explains BASIC to PASCAL conversion. Requires 32K. \$250/\$30

APL/V80—Concise and powerful language for application software development. Complex programming problems are reduced to simple expressions in APL. Features include up to 27K active workspace, shared variables, arrays of up to 8 dimensions, disk workspace and copy object library. The system also supports auxiliary processors for interfacing I/O ports. Requires 48K CP/M and serial APL printing terminal or CRT. \$500/\$30

ALGOL-60—Powerful block-structured language compiler featuring economical run-time dynamic allocation of memory. Very compact (24K total RAM) system implementing almost all Algol 60 report features plus many powerful extensions including string handling direct disk address I/O etc. \$199/\$20

CBASIC-2 Disk Extended BASIC—Non-interactive BASIC with pseudo-code compiler and run-time interpreter. Supports full file control, chaining, integer and extended precision variables, etc. \$120/\$15

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STANDARD CIS COBOL—ANSI '74 COBOL standard compiler fully validated by U.S. Navy tests to ANSI level 1. Supports many features to level 2 including dynamic loading of COBOL modules and a full ISAM file facility. Also, program segmentation, interactive debug and powerful interactive extensions to support protected and unprotected CRT screen formatting from COBOL programs used with any dumb terminal. \$850/\$50

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KBASIC—Microsoft Disk Extended BASIC version 4.51 integrated by implementation of nine additional commands in language. Package includes KISS, REL as described above, and a sample mail list program. \$585/\$45 To licensed users of Microsoft BASIC-80 (MBASIC) \$435/\$45

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RECLAIM—A utility to validate media under CP/M. Program tests a diskette or hard disk surface for errors, reserving the imperfections in invisible files, and permitting continued usage of the remainder. Essential for any hard disk. Requires CP/M version 2. \$80/\$5

BASIC UTILITY DISK—Consists of: (1) CRUNCH-14—Compacting utility to reduce the size and increase the speed of programs in Microsoft BASIC 4.51, BASIC-80 and TRS-80 BASIC. (2) DPFUN—Double precision subroutines for computing nineteen transcendental functions including square root, natural log, log base 10, sine, arc sine, hyperbolic sine, hyperbolic arc sine, etc. Furnished in source on diskette and documentation. \$50/\$35

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STRING/80 source code available separately. \$295/NA

THE STRING BIT—FORTRAN character string handling. Routines to find, fill, pack, move, separate, concatenate and compare character strings. This package completely eliminates the problems associated with character string handling in FORTRAN. Supplied with source. \$65/\$15

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□ **HDBS-Z80 version** \$250/\$40**

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8080 version available at \$75 extra.

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1) MBASIC 4.51, 2) BASIC-80 5.0, 3) Compiled BASIC or FORTRAN-80, 4) COBOL-80, 5) MACRO-80. \$NA/\$10

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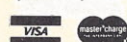
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Computer system	Format Code	Computer system	Format Code	Computer system	Format Code
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Altos	A1*	IMS 8000	A1*	Research Machines 5 1/4"	RH
Apple - SoftCard 13 Sector	RG	IMSAI VDP-40	R4**	REX	R3
Apple - SoftCard 16 Sector	RFP	IMSAI VDP-42	R4**	Sanco 7000 5 1/4"	RQ
BASF System 7100	RD	IMSAI VDP-44	R5**	SD Systems 8"	A1*
Blackhawk Single Density	Q3	IMSAI VDP-80	A1**	SD Systems 5 1/4"	R3
Blackhawk Micropolis Mod II	Q2	Intecolor	See ISC Intecolor	Sorcerer	See Exidy Sorcerer
CDS Versatile 3B	Q1	Intel MDS Single Density	A1	Spacebyte	A1
CDS Versatile 4	Q2	Intertec SuperBrain DOS 0.1	R7	SuperBrain	See Intertec
COMAL-80	Q2	Intertec SuperBrain DOS 0.5-2-X	RJ	Tarbell	A1*
Cromemco System 3	A1*	Intertec SuperBrain DOS 3-X	RK	TEI 5 1/4"	R3
Cromemco 220	R6	ISC Intecolor 8063/8360/8963	A1	TEI 8"	A1*
CSSN BACKUP (tape)	T1#	Kontron PSI-80	RF	Thinkertoys	See Morrow Discus
Delta	A1*	Meca 5 1/4"	P6	TRS-80 Model I 5 1/4"	R2
Digi-Log Microterm II	RD	Micromation	A1*	TRS-80 Model I - FEC Freedom RN	TR
Digital Microsystems	A1*	(Except TRS-80 below)	A1*	TRS-80 Model I + Micromation	A4*
Discus	See Morrow Discus	Micropolis Mod I	Q1	TRS-80 Model I + Omikron 5 1/4"	RM
Durango F-85	RL	Micropolis Mod II	Q2	TRS-80 Model I + Omikron 8"	A1
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Dynabyte DB8/4	A1*	Morrow Discus	A1*	TRS-80 Model II	A1*
Exidy Sorcerer + Lifeboat CP/M	Q2	Mostek	A1	VDP-40/42/44/80	See IMSAI
Exidy Sorcerer + Exidy CP/M	Q4	MSD 5 1/4"	RC	Vector MZ	Q2
Heath H8 + H17/H27	P4	North Star Single Density	P1	Versatile	See CDS Versatile
Heath H89 + Lifeboat CP/M	P4	North Star Double/Quad	P2	Vista V80 5 1/4" Single Density	P5
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Helios II See Processor Technology		Nylac Microscopic Mod. II	Q2	Zenith 289 + Lifeboat CP/M	P4
Horizon	See North Star	Ohio Scientific C3	A3	Zenith 289 + Magnolia CP/M	P7
ICOM 2411 Micro Floppy	R3	Onyx C801	T2#		
ICOM 3712	A1	Perfec PCC 2000	A1*		
ICOM 3812	A1*	Processor Technology Helios II	B2		
ICOM 4511 5440 Cartridge		Quay 500	RO		
CP M 1.4	D1#	Quay 520	RP		
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* Single-Side Single-Density disks are supplied for use with Double-Density and Double-Side 8" soft sector format systems.

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† Recommended system configuration consists of 48K CP/M, 2 full size disk drives, 24 x 80 CRT and 132 column printer.

Ⓢ Modified version available for use with CP/M as implemented on Heath and TRS-80 Model I computers.

① User license agreement for this product must be signed and returned to Lifeboat Associates before shipment may be made.

② This product Includes/excludes the language

③ manual recommended in Condiments.

④ Serial number of CP/M system must be supplied with orders.

⑤ Requires Z80 CPU.

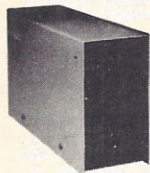
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CCI-189	5 1/4", 40 Track (102K Bytes) add-on drive	\$394
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Same as Radio Shack line printer I

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ANADEx	DP-9500	\$1359	DP-8000	\$825
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ALTOS 64K, DD, SS, 2-Drive, 1MB	\$3995
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TRS-80* Model II-64K	\$3499
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TRS-80* LEVEL II-16K with keypad	\$689
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APPLE 16K	\$989
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ZENITH Z89, 48K all-in-one computer	\$2555
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selected. These include baud rate, number of data bits, number of stop bits, etc. In addition, both packages contain a "dumb terminal" program for communication with a large, main-frame computer. (More on this subject will be in my forthcoming book 8080/Z-80 Assembly Language: Techniques for Improved Programming, John Wiley, 1980.)

The TRS-80 model II contains the necessary hardware to keep track of the time and date. With the FMG version, the commands:

A>CLOCK

A>TIME 11.33.00

A>DATE 10.13.80

will turn on and set the clock hardware. The time and date will appear at the upper-right corner of the video screen. Unfortunately, the time and date display will slow down the operation of other programs. Therefore, the command:

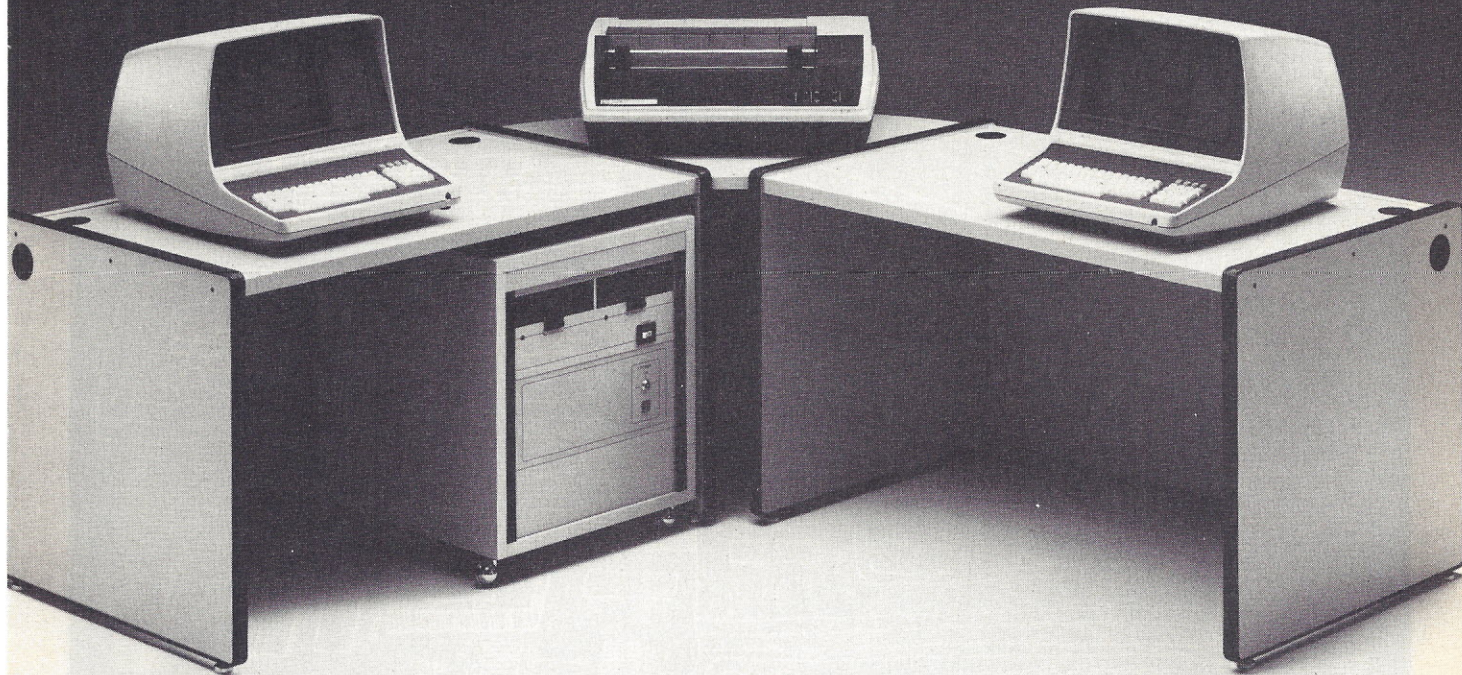
A>CLOCK OFF

should be given so that it will not be displayed. The clock continues to run, of course, and the current values can be obtained by other programs. The month, day, year, hours, minutes, and seconds are stored in that order in BCD format starting at memory location 10 hex. □

Listing 1. Console input and output using CP/M BIOS

```

0100          ORG      100H
;
0100 310001  START:  LXI      SP,100H
0103 3E25    MVI      A,'Z'  ;PROMPT
0105 CD3401  CALL     OUTT    ;SEND
0108 CD2501  NEXT:  CALL     INPUTT ;NEXT BYTE
010B CD3401  CALL     OUTT    ;ECHO
010E FE03    CPI      'C'-@'  ;C
0110 CA0000  JZ       0       ;QUIT
0113 FE04    CPI      'D'-@'  ;D
0115 C20801  JNZ      NEXT    ;RESTART
0118 3E0D    MVI      A,0DH   ;CARRIAGE RET
011A CD3401  CALL     OUTT
011D 3E0A    MVI      A,0AH   ;LINE FEED
011F CD3401  CALL     OUTT
0122 C30001  JMP      START
;
; CONSOLE INPUT ROUTINE
;
0125 E5      INPUTT: PUSH    H      ;SAVE
0126 D5      PUSH    D      ;REGISTERS
0127 C5      PUSH    B
0128 214601  LXI      H,OUT3    ;RETURN ADDRESS
012B E5      PUSH    H      ;PUT ON STACK
012C 2A0100  LHL      1       ;WARM START
012F 110600  LXI      D,6      ;ADD OFFSET
0132 19      DAD      D       ;TO INPUT
0133 E9      PCHL      ;CALL BIOS+
;
; CONSOLE OUTPUT ROUTINES
;
0134 E5      OUTT:   PUSH    H      ;SAVE
0135 D5      PUSH    D      ;REGISTERS
0136 C5      PUSH    B
0137 4F      MOV     C,A      ;OUT FROM C
0138 F5      PUSH    PSW      ;SAVE A
0139 214501  LXI      H,OUT2    ;RETURN ADDRESS
013C E5      PUSH    H      ;PUT ON STACK
013D 2A0100  LHL      1       ;WARM START
0140 110900  LXI      D,9      ;ADD OFFSET
0143 19      DAD      D       ;CALL BIOS+
0144 E9      PCHL
;
; RETURN ADDRESS AFTER CALL
;
0145 F1      OUT2:   POP     PSW    ;RESTORE
0146 C1      OUT3:   POP     B      ;REGISTERS
0147 D1      POP     D
0148 E1      POP     H
0149 C9      RET
;
014A          END
    
```

“Don’t let the size fool you.”

If you need a compact yet powerful computer system, don’t let the space-saving size of the CMC Marketing new 200 series fool you.

The 200 series, one of our three computer systems, is a powerful multi-user microcomputer system employing separate memory and CPU’s for each user. Featuring the standard S-100 bus system, each workstation executes programs at 4 MHz Speed—as fast as the fastest standard Z-80 system.

Best of all, this system does not obsolete your CP/M® based language and application software investments, because the

system is implemented in a CP/M® network. Each workstation executes standard CP/M® programs while a master CPU runs an enhanced version of MP/M®.

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If you’d like more information about CMC Marketing’s powerful new 200 Series, call us toll-free at: 1-800- 231-9833. We feel that when you see the

power of the system, you won’t let the size fool you.

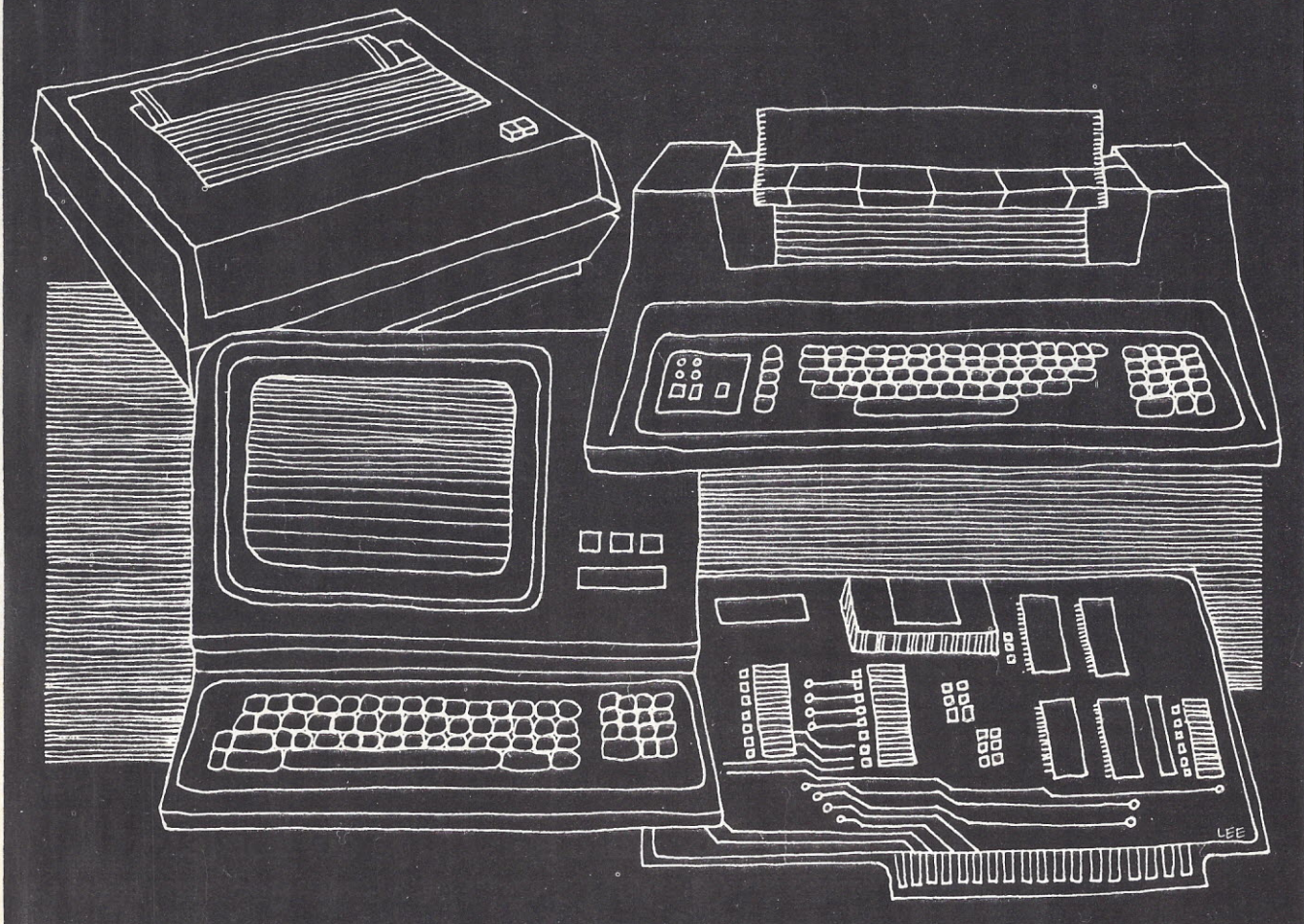


COMPUTER SYSTEMS

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NEW PRODUCTS DIRECTORY



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HARDWARE

I/O BOARDS

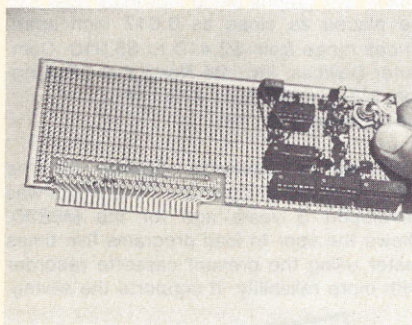
Direct connect modem, Micro Connection, is an integrated RS-232 adapter and direct connect telephone interface designed to be used with any TRS-80 from level I, 4K to level II, 48K; it connects to the computer data bus. Direct connection to the telephone line provides silent operation, an additional 20 db of sensitivity and elimination of errors



due to room acoustical noise. Unlike other modems, it does not "use up" the serial port. Its RS-232 circuitry provides an I/O port for driving any serial printer capable of 300 baud operation, even while the modem is in use. Price: \$249. Micropersipheral Corp., P.O. Box 529, Mercer Is., WA 98040, (206) 454-3303.

CIRCLE INQUIRY NO. 121

Interfaces for videotaping Apple color graphics bridge the difference between Apple computer graphics output standards and those of NTSC video recording and broadcasting equipment. One of the two devices, the Adwar Apple Proc Mod (\$800), is a simpler circuit board easily inserted into the Apple plug-in slot #7. This brings the Apple output sufficiently close to NTSC video equipment tolerances to permit its



direct videotaping. For more exacting applications, such as combining color graphics output through a time-base connector with other video signals through a switcher, the more sophisticated Adwar Apple graphics interface is required. This more expensive device stores an entire non-standard Apple video frame in solid state memory. Adwar Video, 100 Fifth Ave., New York, NY 10011, (212) 691-0976.

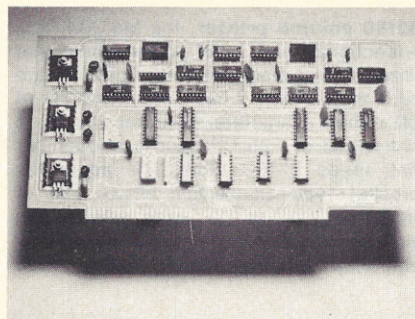
CIRCLE INQUIRY NO. 122

Modem for high-speed short-range data transmission, the LDS 319, is operational in

synchronous and the asynchronous modes at speeds up to 19,200 bps. It is suited for word processing applications where high-speed asynchronous communication is needed. Speeds are switch selectable at 2400, 4800, 9600 and 19,200 bps. Range is up to 12 miles over 4-wire unloaded metallic circuits and features simplified installation with full complement of controls and indicators: on/off switch, speed select and test mode. Indicators include transmit data, receive carrier, receive traffic, signal quality and power. Receiver adjustment is accomplished without instruments using the front panel and internal indicators. Gandalf Data, Inc., 1010 S. Noel Ave., Wheeling, IL 60090, (312) 541-6060.

CIRCLE INQUIRY NO. 123

Dual 12-bit buffered input ports for the S-100 bus, the Spectrum D12BIP logic board, has two input ports with 64 bytes of 'fifo' buffer to allow for data rate mismatches between the source and the processing of data. The board is organized as two external ports of 7, 8, or 12 bits, with non-data bits



usable for control. Each external port is accessed as a pair of input ports, and the 'fifo' buffers operate with 1 MHz strobed by the data source. Spectrum Business Systems, 29350 Southfield Rd., Southfield, MI 48076, (313) 559-5252.

CIRCLE INQUIRY NO. 124

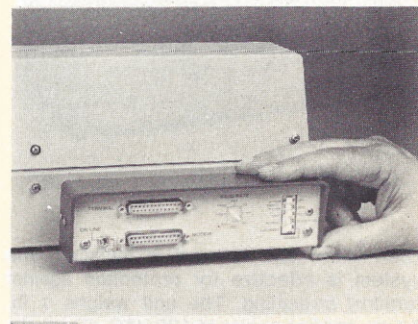
Cassette interface, Fastload, inputs pre-recorded programs into the TRS-80 model I, level II computers at 16 times normal speed. Standard cassettes are loaded at 8000 baud using a modified CTR-41 recorder with the interface. Any cassette program previously saved at normal speed (500 baud) can be loaded at high speed. For short programs, the interface is faster than disk because of disk start up time, and longer programs load in seconds instead of minutes. It is also capable of searching at high speed for Basic programs by a single character designation or for system programs by a name of up to six characters in length. The interface is a small box which nestles under the cassette



recorder and plugs into either the back of the TRS-80 level II, 16K keyboard or the expansion interface. Price: \$188. Personal Micro Computers, Inc., 475 Ellis St., Mountain View, CA 94943, (415) 968-1604.

CIRCLE INQUIRY NO. 125

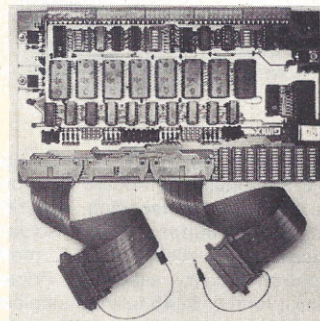
Personality module for Hewlett-Packard's model 7225A, A4-size plotter is offered. This RS-232-C/CCITT V.24 compatible I/O card, HP model 17604A, adapts the 7225A plotter for use in either a direct hardwired or remote data communications computer or microprocessor-based environment. Internal arc and circle generation capability is included. Easy to use, the module is programmed by Hewlett-Packard graphics language,



which is made up of 2-letter English language abbreviations for over 40 plotting commands. Designed for OEM and end-user systems, the module provides plotting capability for those applications requiring remote operations over a telephone line. Model 17604A is \$900 and 7225A is \$2,050. Hewlett-Packard Co., 1507 Page Mill Rd., Palo Alto, CA 94304, (415) 857-1501.

CIRCLE INQUIRY NO. 126

Two I/O boards are offered—one is the 2 Port Serial that has two independent RS-232 compatible I/O ports, with handshaking, on a single 30 pin board. It features jumper programmable connector pinouts for easy cabling, independent baud rate and interrupt jumpers for each port, and the versatile 6850 ACIA. The board is compatible with both the SS50 and SS50C bus configurations. Price is \$128.43, less cables. The second board is the 8 Port Serial that has eight independent RS-232 compatible

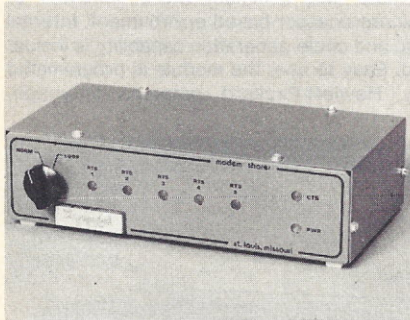


I/O ports, with handshaking, on a single 50 pin board. It features DIP-switch selectable baud rates for each port, extended address decoding for the SS50C bus, selectable interrupts, and the 6850 ACIA. The board is available with an on board baud rate

generator for baud rates up to 38.4K baud. Price is \$318.46, less cables. Gimix Inc., 1337 W. 37th Place, Chicago, IL 60609, (312) 927-5510.

CIRCLE INQUIRY NO. 129

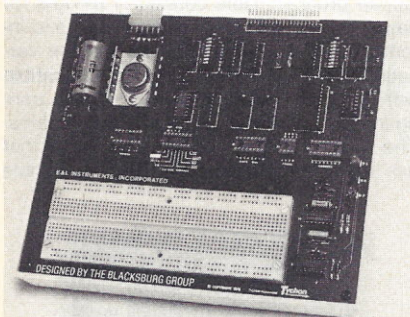
Multiple modems in polled networks are replaced by Modem Sharer. Special port shut-down offers network protection. Features include signal regeneration, automatic port shutdown, LED indicators for RTS and CTS, and a loopback mode for testing purposes.



Even when one terminal is installed, the system is effective for protection against terminal streaming. The unit weighs 1 lb. 14 oz. and has power of 120 VAC, 50-60 Hz, 3 watts. Xyquad Inc., 450 S. Old Orchard, St. Louis MI 63119, (314) 961-5766.

CIRCLE INQUIRY NO. 130

TRS-80 interface accessory provides buffered I/O connections for control, monitoring and testing of external devices and development and testing of I/O devices. The self powered IF-100 plugs directly into the TRS-80 bus, enabling any TRS-80 incorporating Level 2 software to be used for practical applications. The unit contains a

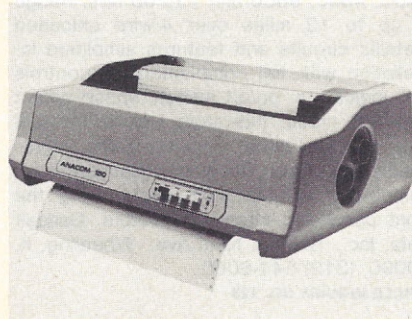


built-in power supply to avoid loading down the TRS-80 supplies, on board logic probe, device and memory decoding, bus buffer, control signal buffering and solderless breadboarding facilities for quick interface and control circuitry assembly. Priced at \$180 in kit form or \$245 fully assembled and tested. E&L Instruments Inc., 61 First St., Derby, CT 06418, (203) 735-8774.

CIRCLE INQUIRY NO. 131

Matrix printer, the Anacom-150, is a table top, 150 c.p.s. printer that prints its 9 x 9

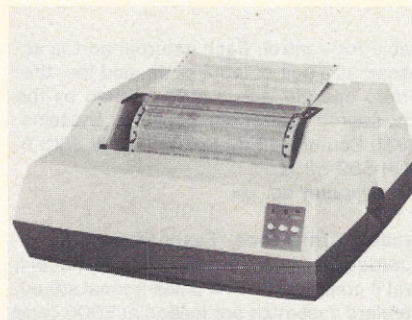
dot matrix bi-directionally while logic seeking the quickest way to print the next line. It has a 136 column format but accepts tractor fed paper of any width. Vertical format is programmable as are double width characters. Interfacing is accomplished by use of a per-



sonality board with parallel or serial interface supplied at required at no additional cost. Price: \$1,350. Anacom General Corp., 1116 E. Valencia Dr., Fullerton, CA 92631, (714) 992-0223.

CIRCLE INQUIRY NO. 132

132/80 column printer, the MS-204, is a bi-directional, 9 x 7 dot matrix printer that utilizes a print mechanism of simple design and high reliability. It has a print head life of 100 million characters. Features include a print speed of 125 CPS and a through-put print speed of 63 LPM. The adjustable sprocket feed mechanism allows use of forms from 2½" to 9½" wide, with loading from either the bottom or rear. A full 96 Ascii set permits printing upper and lower case

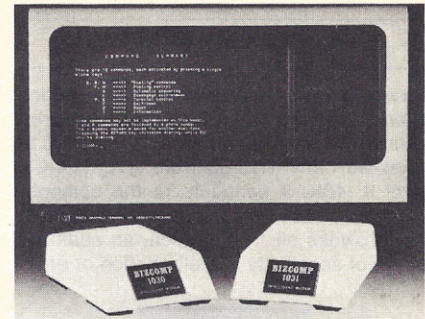


characters which can be expanded for double width fonts in bold face. The vertical format unit provides pre-programmed/programmable tab positions, top of form and bottom of form. The printer offers the flexibility of 40, 66, 80 or 132 characters per line. It's compatible with TRS-80, Apple, Pet, Sorcerer or any other Centronics-type system. Price: \$795. Matchless Systems, Dept. 7, 18444 S. Broadway, Gardena, CA 90248, (213) 327-1010.

CIRCLE INQUIRY NO. 133

Intelligent modem, model 1030 combines low error rate with an automatic calling unit and custom BIZ-080 microcomputer into a compact FCC-registered unit with auto-answer, auto-dial and auto-repeat dial features. The code-multiplexed design allows intelligent modem control using the same terminal as that for data communication. For computer sites, code-multiplexing also enables communications software to be

written in high level languages such as Basic or Cobol, speeding development time. Applications include computer/terminal net-



working, financial transaction entry, store-and-forward message routing, remote database access and remote computer diagnostics. Interfacing to RS232-equipped computers, terminals and word processors requires a 3-wire data cable. A current loop interface is also standard. Model 1031 adds command-selectable dial pulse or tone dialing. Prices: Model 1030 is \$395 and 1031 is \$495. Business Computer Corp., P.O. Box 7498, Menlo Park, CA 94025, (415) 854-5434.

CIRCLE INQUIRY NO. 134

Portable printer/plotter, Miniterm, is capable of plotting up to 3,420 dots per square inch and achieving horizontal speeds of up to 24 inches per second between plotted points, the thermal matrix printer/plotter comes complete with switch-selectable 80/132 column alphanumeric printer feature. Other features include microprocessor control, a 45-character buffer, a full 96-character Ascii set of upper and lower case characters, and a patented print head control mechanism. The model 1203 KSR circumvents the delays inherent in time-sharing applications where graphic output is required. Graphics can be printed on the portable, remote terminal instead of at a central time-sharing computer location. In its non-graphic mode, the 5 x 7 dot matrix, friction feed printer offers print speeds up to 50 characters per second. The high-resolution dots blend to create solid charts and graphs since individual dots can be placed as close as 0.017 inch apart. Prices range from \$2,410 to \$5,910. Computer Devices, Inc., 25 North Ave., Burlington, MA 01803, (617) 273-1550.

CIRCLE INQUIRY NO. 135

High speed cassette system for the TRS-80 II, based upon the TC-3 which was developed 3 years ago for the M6800, allows the user to load programs five times faster using the present cassette recorder with more reliability. It supports the saving,

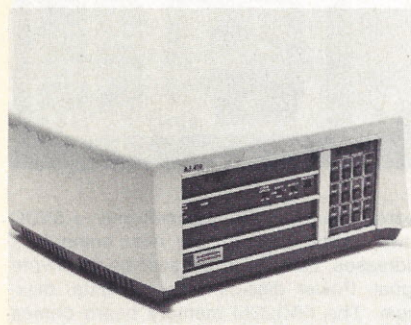


loading, and verifying of Basic programs, system programs, and data files. Features

include 8-character named files, the ability to list the directory of all files on a tape, verification of saved files, and a far more efficient data file storage technique which closely resembles that of a disk system. In kit form \$90; fully assembled, \$120. JPC Products Co., 12021 Paisano Ct., Albuquerque, NM 87112, (505) 294-4623.

CIRCLE INQUIRY NO. 136

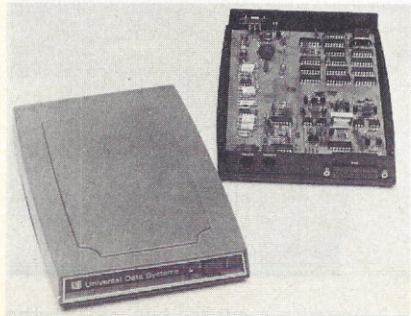
Electronic Mailbox, AJ 410, an intelligent terminal controller, provides for the buffering, editing, storage and transmission of up to 32K characters of data. The system increases communications efficiency by allowing high speed traffic to flow between buffers without operator intervention. It reduces operator training time with easy-to-use English language commands and increases operator productivity with automatic message formatting and powerful text editing capabilities. The dynamic buffer allows simultaneous message preparation, reception and transmission. In point-to-point



as well as message switched networks, the unit can transmit and receive at speeds much higher than a terminal, thus reducing message traffic costs and computer time costs. Messages can be corrected during preparation or may be recalled from the send buffer for editing at any time before transmission. Editing capabilities permit replacements, additions, or deletions of individual characters, words, or complete sentences. Three types of lease plans are available. Anderson Jacobson, Inc., 521 Charcot Ave., San Jose, CA 95131, (408) 263-8520.

CIRCLE INQUIRY NO. 137

Bell-compatible modem, 202 LP, provides half-duplex asynchronous communication at 1200 bps over ordinary two-wire telephone circuits. The unit functions without conven-

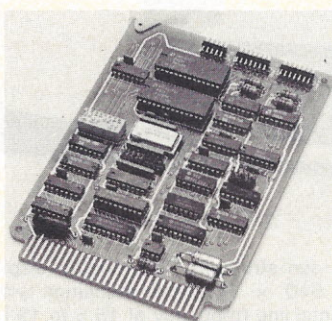


tional public utility power. Since all operating power is drawn from the telephone line, AC power connections are eliminated. The modem is FCC-certified for direct connec-

tion to the dial-up telephone network. Originate/answer and data/talk options are both switch selectable. The unit is less than 1 1/4" thick, and is configured to fit under an ordinary telephone handset. The modem is installed with three snap-in connections. Price: \$295. Universal Data Systems, 5000 Bradford Dr., Huntsville, AL 35805, (205) 837-8100.

CIRCLE INQUIRY NO. 138

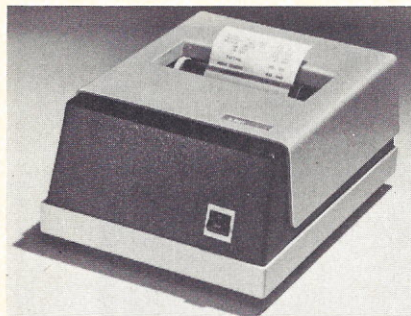
Dual serial interface, SB8420, provides two independent RS-232C/20ma communication channels to STD bus systems. Each serial channel is capable of full duplex operation in either synchronous or asynchronous modes, at a switch selectable baud rate from 50 baud to 19.2K baud. Modem controls are also provided. This allows STD bus users to communicate with CRT terminals, printers, modems, Prom programmers and host computers. The serial channel is I/O mapped, and includes an interrupt



mask register and an interrupt output connector. A socket and control logic are also provided for a 256 byte Prom that can be enabled at system reset to overlay system RAM. This allows RAM based systems to be initialized, and used to bootstrap programs from mass storage devices. Pricing in 1-9 quantities is \$325. Micro/sys, Inc., 1353 Foothill Blvd., La Canada, CA 91011, (213) 790-7957.

CIRCLE INQUIRY NO. 139

Dot-matrix impact printer, 7000 +, interfaces with TRS-80s, Apples, PETs and most small computers. The printer prints unidirectionally with a line speed of 1.25 lines per second. Any type of roll paper may be used. It accepts any single- or two-ply paper roll from 3/4-inch to 3 7/8-inches wide, and

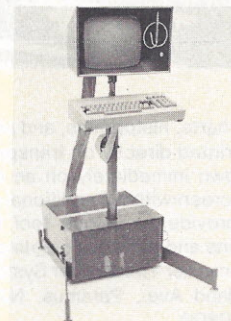


prints a 3 1/3-inch line. Capacity is adjustable to either 40 or 64 columns. The printer comes equipped with a 100-million character life printhead and has an overall mechanism life of 10-million cycles. Interfacing the printer with most personal computers

requires an expansion interface adapter and cable. I-mark, P.O. Box 11852, Atlanta, GA 30355, (404) 231-4105.

CIRCLE INQUIRY NO. 140

Distributive processing terminal, Model 427, is available in two versions—desk or drafting table model, or pipe column model. The adjustable height CRT is mounted on a telescoping pipe column, the keyboard can be mounted at center or placed elsewhere, at the base is the microprocessor, power supply, and interfaces. Up to four CRT stations and four I/O devices may be operated from one terminal. The basic model comes with light pen; microprocessor; optional expandable memory to 65K; screen capacity of 2048 alphanumeric characters in choice of



format; CRT displays 20 lines, buffers 12 lines, allowing 32 lines by rolling screen; full 128 character upper and lower case Ascii keyboard; 7 x 12 dot matrix character cell; 12-inch raster scan screen; full or half duplex asynchronous data transmission up to 9600 baud with EIA RS232C interface; optional synchronous protocol; and choice of parity and number of stop bits. Price: \$3,680 for desk or drafting table model and \$3,910 for pipe column model. Computer Talk, P.O. Box 100, Idledale, CO 80453, (303) 697-5485.

CIRCLE INQUIRY NO. 141

Letter-quality printer, the Typrinter 221, is a letter-quality daisywheel with five built-in microprocessors providing complete text formatting including right justification and proportional spacing. The printer, which also functions as an electronic typewriter, is



compatible with all micro, mini and main-frame computers. It utilizes a parallel Centronics interface, with RS-232C and IEEE-488 interfaces also available. Howard Industries, Inc., 2031 Cerritos Ave., Anaheim, CA 92806, (714) 778-3443.

CIRCLE INQUIRY NO. 143

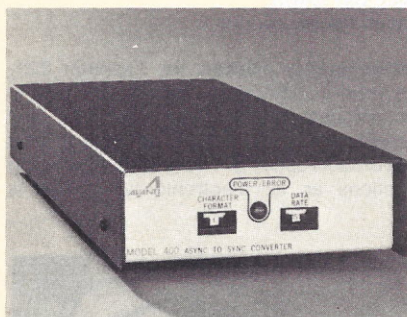
Send/receive printing terminal to produce low cost, interactive business graphics is completely portable (16 lb.). Execuport 4000G features full width 136-column (14-7/8-inch) printout on paper or transparent film. It also operates with 80 column (8-3/4-inch) printout. In the graphics mode, the quiet thermal printer produces time



plots, bar charts, histograms, and pie charts. Graphics printed directly on transparent film can be shown immediately on an overhead projector screen without additional processing. This provides a unique tool for sales presentations and business meetings. Price: \$3,795. Computer Transceiver Systems, Inc., E. 66 Midland Ave., Paramus, NJ 07652, (201) 261-6800.

CIRCLE INQUIRY NO. 144

Asynchronous to synchronous converter, Avanti 400, allows any asynchronous terminal, regardless of character format, to interface with any synchronous modem. It is equipped with its own power supply, thus, totally independent of the modem. The front panel is equipped with a 16-position switch to facilitate data rate selection (50 to 19,200 bps) and a character format switch, in addition to a single green/red LED to indicate whether there are parity, framing or



overflow errors. In addition to the front panel switches and indicator, the rear panel houses a fuse, AC socket and two female connectors. Installation consists of two EIA RS 232C cable connections to the rear panel connectors, and an AC power cord. Price: \$300. Avanti Communications, Aquidneck Industrial Park, Newport, RI 02840, (401) 849-4660, TWX 710-387-6543.

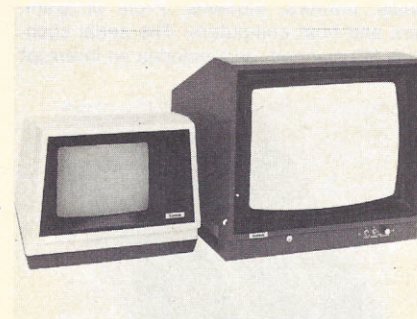
CIRCLE INQUIRY NO. 145

High-speed coax modem, HSM 100, designed to bring high reliability and maximum flexibility to private networks, is factory-set to operate at baud rates from 100 Kbaud to 2.5 Mbaud, as specified by the user. The unit interfaces with data equipment in full or half duplex synchronous mode

through standard 25-pin RS232 or 37-pin RS 422/423 connectors. It will operate at distances up to 7,000 feet over low cost RG62 A/U coax cable. It includes transmit and receive clocks, providing high throughput, low error rate communications for applications such as data acquisition, micro-mini communication, and computer graphic networks. It is suitable for use in plant environments. Price: \$825. Systems Associates, 55 Park, Troy, MI 48084.

CIRCLE INQUIRY NO. 146

Color monitor uses a 25-inch color shadow mask CRT with 0.367 mm pitch (vertical). The GM 865C 1000 line monitor provides a large screen direct view presentation for small group viewing. Another series of monitors is the GM 714 which utilizes the CRT with ultra-fine pitch shadow mask and

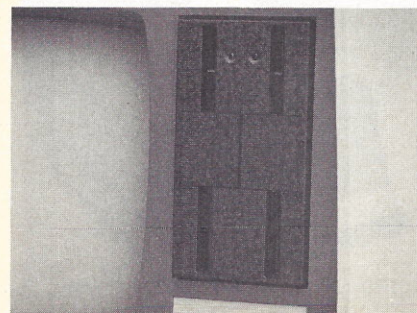


in-line gun structure. The monitor displays up to 640 x 512 pixel resolution with a horizontal line frequency of 15.5 to 19 kilohertz. Standard units are available in rack-mount or cabinet version with standard or long persistence phosphors. The GM 865C is \$12,400 and the GM 714's price starts at \$2,200. The monitors are used in mapping, command, and control, CAD/CAM, process control and image processing applications. Ramtek Corp. 2211 Lawson Ln., Santa Clara, CA 95050, (408) 988-2211.

CIRCLE INQUIRY NO. 148

MASS STORAGE

Dual drive kit for Heath/Zenith H89 and other systems, allows dual drive in place of one. The dual drive takes the same space and power requirements of the single drive. In the H89, 200 kilobytes of disk storage is available all the time. Diskettes may be recorded on both sides by flipping the disk

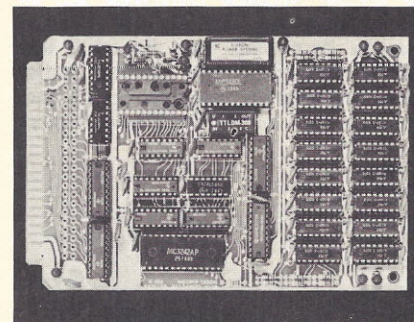


over without modification. Price: \$600 with trade-in of a working single drive unit. Instructions, dual drive, manual, and cable provide all parts required for the upgrade.

Wisconsin Intelligent Systems Engineering, Box 344, 422 3rd St., Baraboo, WI 53913, (608) 356-9432.

CIRCLE INQUIRY NO. 155

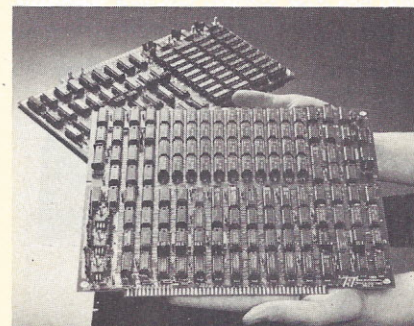
Dynamic memory board 6502DM comes fully assembled and tested, and is compatible with any 6502 CPU-based processor such as the Aim, Kim, Sym, or Pet, that operates at maximum clock rates of 1.2 MHz. Available in choice of several memory sizes, ie: 32K, 16K, or 8K, the memory is organized in 4K blocks, each independently addressable on any 4K address within the 64K address space. All inputs are buffered with 1LS TTL load. The unit connects to the expansion connector by adding the supplied right angle connector to the back of the



board. The interface requires only +5VDC power (obtained from the host computer), addresses, data, ϕ 2 clock and the read/write signal. Power dissipation is 4 watts, maximum. The 6502DM memory board comes with complete documentation and is guaranteed for one year. Prices are \$395, \$339, and \$279 for the 32K, 16K, and 8K respectively. Beta Computer Devices, 1230 W. Collins Ave., Orange, CA 92668.

CIRCLE INQUIRY NO. 156

Error correcting memory board runs in any IEEE standard S-100 bus. Designated Supermem 3, the memory can address up to 16 megabytes and can be configured for either 8- or 16-bit processors. It features powerful error checking and correcting circuitry that can detect and correct all single-bit errors automatically before they reach the CPU. All double-bit errors and even component failures are reported. Single- and double-bit error reporting is controlled by software. An error status register is available

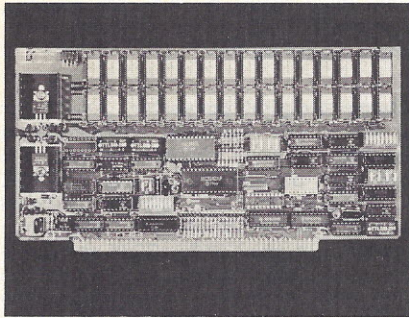


for interpreting syndrome bits into a failing memory location. Memory refresh is totally transparent to the processor. The unit includes 64K bytes on a double-height board. The larger board—9 by 10 inches—adds to

the flexibility of the memory in 16-bit systems. The larger board size conforms to the new, updated IEEE standard for the S-100 bus. The memory operates at 3 MHz in either 8- or 16-bit systems. Access time is a maximum 330 ns. with a cycle time of 400 ns. Price: \$1,700. Plicoon Inc., OEM Computer Products, 2350 Bering Dr., San Jose, CA 95112.

CIRCLE INQUIRY NO. 157

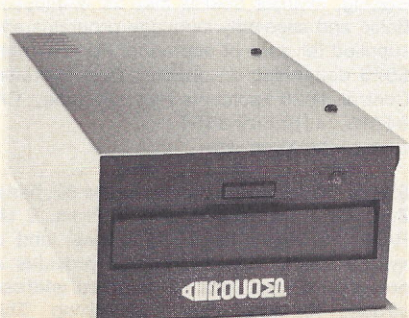
64K RAM modul, DM6400, is fully compatible with Cromemco, North Star, Processor Technology's Sol 20, Vector Graphics, Ithaca Audio, Mits, Marin Chips M9900 and most other 8080 and Z80A based S-100 systems. It will also run with most 8085, 3 MHz CPU boards. Each module contains a dynamic memory array, bus interface/control logic, on-board crystal timing, refresh oscillators, and voltage regulators. The on-board refresh timer and 25 MHz crystal oscillator generate internal timing signals for read/write and



refresh functions to assure proper operation with minimum reliance on bus timing. This provides all the necessary signals to refresh memory array without interfering with or cycle stealing from a bus memory user. The bus memory user never sees a delay due to the refresh function. The memory board is deselectable in 4K increments and has a power dissipation of 8 watts maximum. All DM6400 boards are 100% burned-in and are guaranteed for one year. Measurement Systems & Controls, 867 N. Main St., Orange, CA 92668, (714) 633-4460.

CIRCLE INQUIRY NO. 158

Disc drives based on the MPI bare drive include the following features: (1) stepper-band positioner provides fast access time (5 ms) and accurate positioning. (2) human factors engineering provides a full-closing, push-button front door for greater media protection, plus a patented disc ejector pops the diskette out within easy fingertip reach; (3) true diskette centering is accomplished as the front door is closing: the extra-long clutch expands and gently



engages the media. When the clutch is seated, the diskette is locked securely in position to within 0.0008 inches. Accurate positioning, longer diskette life and trouble-free operation are the result; (4) low power consumption—6 watts standby, 12 watts operating—due to a high precision stepper motor with Samarium-Cobalt magnets, proprietary electronics on a single PCB incorporating low power Schlottky and a low-friction positioning mechanism; (5) all write-protect and index sensing functions are accomplished optically, no mechanical switches. Aerocomp, Box 24829, Dallas, TX 75224, (214) 337-4346.

CIRCLE INQUIRY NO. 159

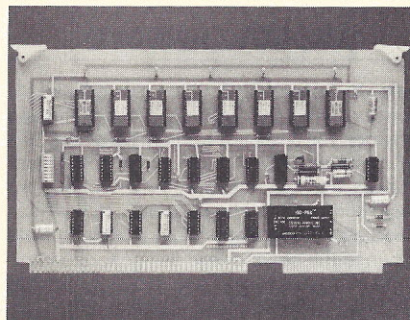
8-inch floppy disk drives, Maxi-Disk, are now compatible with TRS-80 model II. No software or hardware changes are needed. Activity lights help protect against errors by informing the user when it is safe to remove diskettes. Each drive is completely self-contained in its own cabinet. Additional



drives are simply plugged in. A drive can be removed for service without disturbing any other drives on the system. Three Maxi-Disk drives take up only one-half the space of the three drive box. Price: \$845. Parasitic Engineering, 1101 9th Ave., Oakland, CA 94606, (415) 839-2636.

CIRCLE INQUIRY NO. 160

Memory board, E4K Earam, provides a Multibus compatible non-volatile memory of up to 4K x 8 capacity using plug-in Earam ICs. The memory contents are electrically alterable under computer control permitting it to function as a RAM, but with the advantage of long-term unpowered data retention.



Either word or block erasure is possible. Operating software listings are provided. Typical applications include remote data acquisition systems, numerical control systems, process controllers, storage of manually entered constants, and telephone

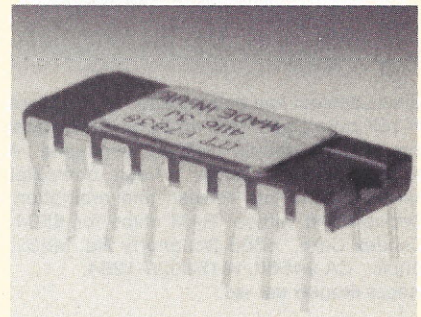
number storage. Schneider Instrument Co., 8115 Camargo Rd., Madeira, OH 45243, (513) 561-6803.

CIRCLE INQUIRY NO. 161

Intelligent memory board, IM-1680, offers 16K bytes of static RAM and sockets for eight 2716 Eeproms, interfaced to Intel's Multibus. Its intelligence is derived from an on-board Z-80 microprocessor CPU. A minimum number of components is used to interface the Z-80 CPU to memory. As a result, the addition of the CPU does not appreciably increase the cost of the board which is priced competitively with RAM-only boards. It can be used as regular memory or the on-board Z-80 can be activated under program control to process data in parallel with the Multibus master. Several IM-1680 boards can be used in a system to increase memory capacity and/or processing capability. With suitable programming of the on-board Z-80, the IM-1680 can be used as an array processor, associative memory, digital signal processor, data base processor, etc. Applications include: all memory applications, especially those requiring reliability of static RAM; multiple station process control; machine monitoring; timesharing; digital signal and array processing; associative memories; sorting; data base processors; biomedical signal analysis. Price: \$595. Microsignal, 3704 State St., Suite 214A, Santa Barbara, CA 93105, (805) 687-8608.

CIRCLE INQUIRY NO. 162

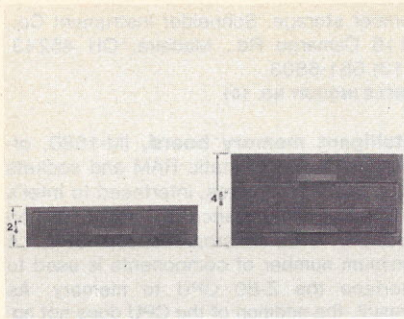
Memory expansion kit for upgrading micro-computer systems including TRS-80, Apple, Sourcerer and SD Systems (all S-100 applications) contains eight prime, burned-in and tested 4116 16K RAMs. The kit can be supplied for either computer or interface



installation. Memory performance is rated at 200 nanoseconds access time and is fully compatible with 4 MHz Z-80 systems. Price: \$95. UHF Associates, 90 Transport Ave., #4, Rohnert Park, CA 94928, (707) 584-7844.

CIRCLE INQUIRY NO. 163

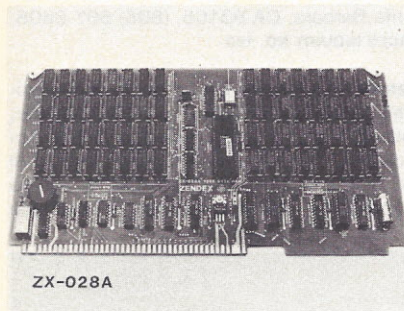
Eight-inch floppy disk drive is less than one-half the height of any other model. Storage capacity of word processors and small computers are doubled by installing two drives in the same cabinet space. Height is 2-1/8 inches at the highest point, 12-1/2 inches long and 8-1/2 inches wide. The drive is available with dual heads (model 82) for reading/writing on both sides or one head (model 81) for single side operation. Storage capacity is 800K bytes for the single-head model and 1,600K bytes for the dual. The head assembly incorporates a fixed bottom head with a gimbaled top head. This assembly, in conjunction with a precision chassis design, provides more than 3 million in-



contact passes of media over a single track without disk wear. An automatic disk positioning and ejector mechanism pre-positions the disk over the spindle hub before the clutch centering device is engaged. Micro Peripherals, Inc., 9754 Deering Ave., Chatsworth, CA 91311, (213) 709-4202.

CIRCLE INQUIRY NO. 164

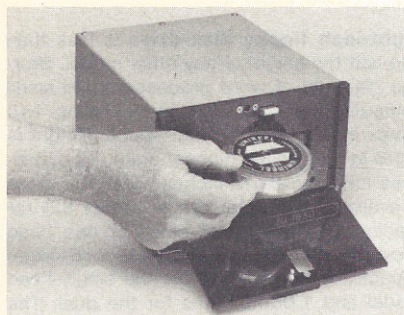
RAM board, ZX-028A, fits the multibus and will decode all 20 address lines and the byte high enable line to provide either 64K 16-bit words or 128K 8-bit bytes. The "A" suffix in the model number represents a revision of an earlier offering. This revision has two push-on jumpers that allow the board to accept either 64 5-volt RAMs, or 64 three-supply RAMs. An 8-position dip switch



allows deslect and depopulation of the board in 16K byte steps. One rotary switch selects one-of-eight double address segments. A single 8202A dynamic refresh controller handles all timing, refresh and arbitration. Depopulated without RAM chips for \$534. Zendex Corp., 6398 Dougherty Rd. MS32, Dublin, CA 94566, (415) 829-1284.

CIRCLE INQUIRY NO. 165

Magnetic tape unit, Model IU 1650, backs up non-removable hard disc drives. Storage capacity is 56 megabytes (unformatted) at 6400 BPI on 9 tracks with a transfer rate of 250 KBPS. The drive utilizes a single motor

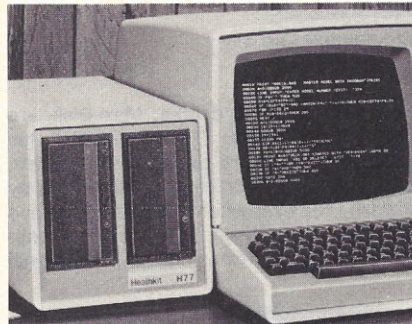


in a low cost mechanism which automatically self-threads the tape. It reads and writes at

40 IPS and has high speed search. The tape package is a removable, self protecting, 650 ft. reel of 1/2-inch magnetic tape. Interdyne, 14761 Califa St., Van Nuys, CA 91411, (213) 787-6800.

CIRCLE INQUIRY NO. 168

Floppy disk accessory, the H-77, for the Heathkit H89 provides room for up to three floppy disk drives and allows operating system and program disks to run at the same time. The unit uses standard 5 1/4-inch, hard



sectored 40-track diskettes, capable of storing 100K bytes each. Siemens 82 disk drive system that is used provides high-speed access to data. Price is \$595 in kit form and includes one disk drive. Heath Co., Benton Harbor, MI 49022, (616) 982-3210.

CIRCLE INQUIRY NO. 170

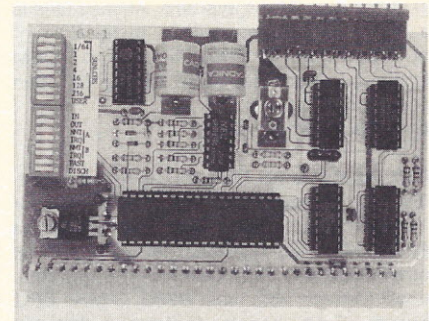
Flexible disk system, a double-sided, double-density DEC RX02, offers features for the DEC LSI-11. The DSD 470 reads and writes on both sides of 8-inch diskettes for a formatted capacity of one megabyte per diskette, or two megabytes of on-line storage. The disk system, which is hardware-, software-, and media-compatible with DEC LSI-11 computers, features a built-in hardware bootstrap, diskette formatting, and onboard diagnostics—a series of micro-programmed user-selectable routines which verify proper operation of the disk system, debug to the chip level and provide detailed status reports. Price: \$4,295. Data Systems Design, Inc., 3130 Coronado Dr., Santa Clara, CA 95051, (415) 727-9353.

CIRCLE INQUIRY NO. 171

MISCELLANEOUS

Calendar/clock (CLK 68-1) plus parallel I/O port for the SS-50 bus is self-contained and provides for on-board recharging of the batteries when the computer is on. It is solder masked and has silk screened legends for easy component identification. It provides time/date information in 12/24 hour formats (down to the second) and can generate interrupts at intervals from 488 microsec. to 256 sec. (dip switch/software selectable). Setting or reading of the time/date is accomplished with software (provided in the 36 page instruction manual). Complete software drivers are provided plus a simple program to read the time in Basic. A patch is provided to add the time/date printout to the TSC assembler. A fully buffered I/O port (in-

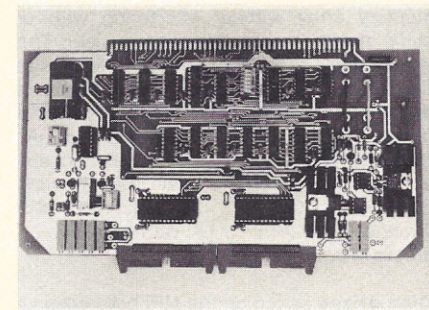
dependent of the clock) provides for keyboard, printer, etc. The unit, assembled and tested, sells for \$119.95 or as a kit for \$89.95. Options include 2 MHz parts (\$2.50),



gold 30 pin bus connectors (\$7.50), and software on disk (Smoke Signal Broadcasting—specify 5 or 8 inch—\$14.95) or cassette (Kansas City Standard—\$12.95). The manual is \$10 (refundable with purchase of CLK 68-1). Robertson Electronics, 1003 Warm Sands Dr. S.E., Albuquerque, NM 87123.

CIRCLE INQUIRY NO. 174

Analog-to-digital converter, Aim-12, for laboratory and industrial applications is specified at 32/16 channel, 12 bits. The card plugs directly into the standard IEEE S-100 bus. Features include on-board resistor programmable instrumentation amplifier with gains up to 1000X and operation up to 25 microsecond conversion times with 12 bits of accuracy and precision. The converter is completely I/O mapped and may be used with either Basic or assembly language instructions. The module is designed for direct conversion of voltages from thermo-

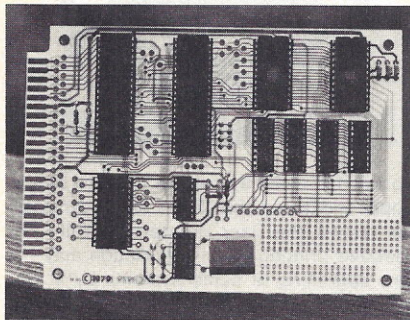


couples, level sensors, pressure transducers, pH electrodes and other low level signals, and may be utilized for higher level signals as well. It provides 32 single ended or 16 fully differential inputs; input impedance exceeds a billion ohms, and is fully compatible with North Star, Cromenco and most S-100 bus computers. Data may be sampled at rates up to 30 KHz. The board is directly addressable with the address selected by dip switches. For extensive data logging, multiple boards may be employed. Basic and assembly language programs are supplied for ease of operation. Price is from \$575 depending on options. Dual Systems Control, 1825 Eastshore Hwy., Berkeley, CA 94710, (415) 549-3854.

CIRCLE INQUIRY NO. 175

Single board microcomputer, M-80, has a Z-80 CPU, sockets for 2K/4K Prom, 2.1K RAM, 16 highly flexible I/O lines, and a system clock. The board also provides a breadboard area, and 12 decoded address strobes for easy user customizing. The

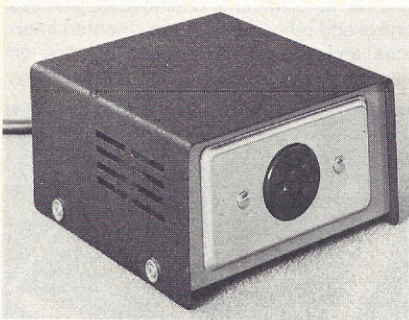
4.5-inch by 6.5-inch board was designed for test equipment, smart peripheral controllers, and dedicated control and processing applications. The board may be mounted in a card cage or by standoffs. Two software packages are currently available. A powerful



monitor contained in a single ROM enables the user to dump or enter data into memory, set breakpoints, control I/O lines, or download programs from another computer. An integer Basic provides 30 functions and commands, and permits calling machine language routines. Both monitor and Basic use serial I/O for communications. Unit prices start at \$28.50 for the bare board, \$69 for a kit, and \$185 for a fully assembled and tested board. Miller Technology, 16930 Sheldon Rd., Los Gatos, CA 95030, (408) 395-2999.

CIRCLE INQUIRY NO. 176

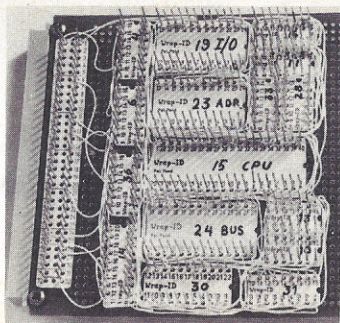
AC line filter eliminates line noise. The filter is design rated for 15 amps service and will eliminate voltage spikes and high frequency noise. Many of the problems with spurious data bits appearing under an environment



which was proven to be reliable are often the consequence of a change in the AC input line source. Noise in an AC line can be caused by conditions beyond ones control such as a storm damaged/alterd line insulators, transformers, and associated devices in the power company's system. The potential data/file and downtime losses associated by such transient AC conditions make the inclusion of an AC line filter in a microcomputer system almost a necessity. It is designed for use on the TRS-80 and can also be used with other systems not drawing more than 15 amps at 110 volts. Price: \$59.95. Bluebirds, 2267 23rd St., Wyandotte, MI 48192, (313) 285-4455.

CIRCLE INQUIRY NO. 177

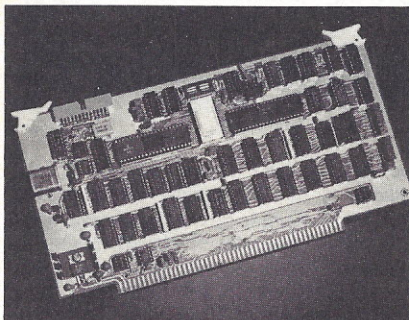
Socket - Wrap I.D. identifies pin numbers on wire-wrapping sockets. Consisting of a socket-sized plastic panel with numbered holes in the pin location, the unit is slipped onto the socket before wrapping. One can also write on them for easy identification of location, IC



part number, function, etc. These unique items simplify both initial wire-wrapping and subsequent troubleshooting or repair. O.K. Machine and Tool Corp. 3455 Conner St., Bronx, NY 10475, (212) 994-6600.

CIRCLE INQUIRY NO. 178

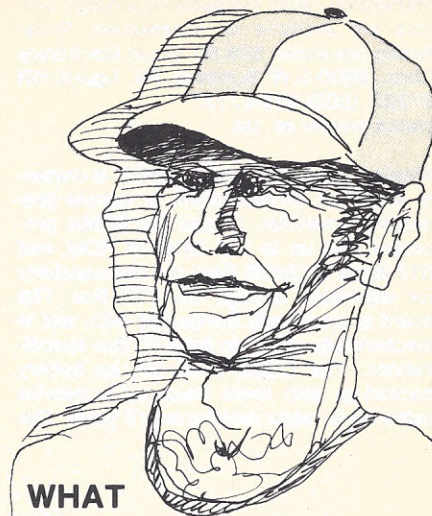
2810 Z-80 CPU board gives the user of an S-100 system the speed and large instruction set of the Z-80. It supports front panel operations and is fully compatible with the Altair and Imsai computers, as well as the majority of S-100 systems without front panels. Options include an RS-232C serial I/O port which can be used for a console interface, I/O address mirroring, a power-on jump to any location in 64K, and M1 wait states with optional wait state generation. Standard features include a jumper-enabled 2K ROM containing monitor firmware. The monitor features an auto-baud select allowing the serial port to match any baud rate from 2 to



56K baud set at the console. Phantom overlay of the ROM's memory space can be enabled: 'Refresh', NMI, and MREQ. A switch allows the user to select a clock rate of 2 or 4 MHz. The board also features CPU and baud rates ICs with separate crystal controls, and LEDs to indicate a halt state, ROM enabled, and interrupt enabled. California Computer Systems, 250 Caribbean Dr., Sunnysvale, CA 94086, (408) 734-5811.

CIRCLE INQUIRY NO. 179

Analog pre-scaler, for use with A/D interface card for the Apple, allows voltages other than the 0-5 volt range to be used with the interface and also allows the direct hookup of sensors (temperature, light, etc.). It connects to the card with a ribbon cable and requires no external power. Each channel is provided with its own jack, amplifier (max. gain = 10), and adjustment potentiometers. In addition, each channel has switchable biasing to be used with various sensors. Voltage calibration may be accomplished without the use of lab equipment since the card has its own calibrated reference. Comes complete with case and



WHAT IF

Muldoon hits 450 for August and Whitey's pitching has an ERA of 2.5? Will the TV ratings improve enough to get back the Big Advertisers? Will the testimonial money come through?

T/MAKER gives me the totals fast on my CRT screen. I can trade players, switch player positions, and play with many variables and see what happens before the front office gets involved.

T/MAKER integrates numerical and text data and makes it easy to analyze and present a player's contract with all edited text. All figures and calculations can be reviewed on our CRT and finally printed out in hard copy form.

T/MAKER is a wonderful tool for data analysis. It is easy to set up calculations for rows and columns of tabular data, automatically perform the computations, review the results and then modify some of the data to see the impact on the over all results. Several days of manual work can be accomplished in minutes.

T/MAKER is a full screen editor for word processing which handles text up to 255 characters wide. It includes features like text formatting and justification, text buffer for block moves and repeated inserts, global search and replace and commands for printing your letters, reports and documents.

T/MAKER can perform an unlimited number of analysis and reporting tasks which integrate numerical and text processing. For example:

- Financial Statements • Balance Sheets
- Statistics • Growth & Projections • Profitability Reports • Revenues & Expenditures • Portfolio Analysis • Price Lists • Rate Structures • Inventory Valuation. . . . and much, much more.

T/MAKER requires a 48K CP/M system, a total of 240K bytes of disk storage, CBASIC-2, and a CRT computer terminal with cursor addressing and clear screen.

T/MAKER system is \$275.00 complete with documentation and quick-reference card. Documentation alone is \$25.00.

LIFEBEAT ASSOCIATES

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International Telex 220501

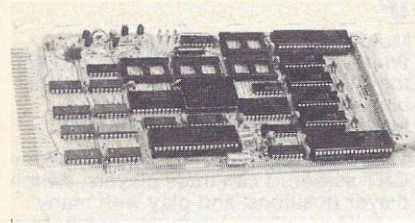
T/MAKER is a trademark
of P. Roizen
CP/M is a trademark
of Digital Research



connection cable; temperature and light sensors are available as accessories. Price: Analog pre-scaler, \$99.50. Street Electronics Corp., 8900 S.W. Burnham, F9, Tigard, OR 97223, (503) 620-2713.

CIRCLE INQUIRY NO. 180

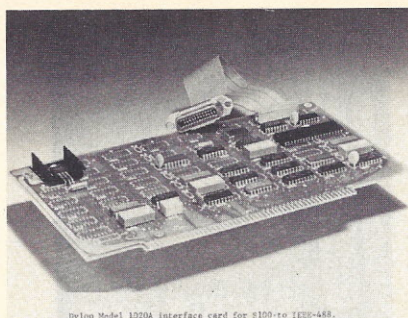
Single board computer, ICB-85, is uniquely suited as an instrument or remote processing controller. It uses the 8085A processor with up to 16K bytes of ROM, and 512 bytes of CMOS RAM and has capability for expansion through the STD Bus. The board is electrically compatible with, and is mechanically similar to the STD Bus specifications. The CMOS RAM can be battery backed-up with three inexpensive pen-lite batteries to retain data for over 2 years. The



board can accommodate 5 different Proms: 2708, 2758, 2716, 2732, and 2516. The type of Prom is configured via a jumper block specific to the Prom being used; 4 sockets are provided for the Proms. Two 8255As are used to give 48 parallel I/O lines. In addition, 2 serial I/O lines are available from the 8085A. Power requirement is +5V at 750ma (plus power for the ROMs). Prices: 100 unit quantity, \$290; single unit, \$390. Computer Products Group, Box 2276, Gaithersburg, MD 20760, (301) 948-7650.

CIRCLE INQUIRY NO. 181

Universal interface between the general purpose interface bus and all S-100 microprocessor systems, model 1020A, communicates with the microprocessor by means of input/output ports. The interface complies fully with the IEEE-488 standard and the proposed IEEE-696 (S-100) standard and may be configured either for polled or interrupt driven input/output functions. The model handles all IEEE-488 functions such as talker, listener and controller, with

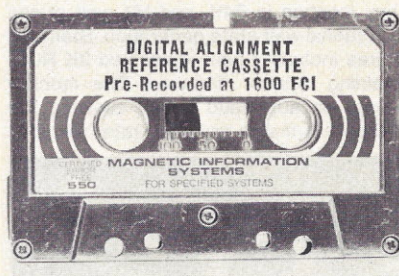


Dylon Model 1020A interface card for S100 to IEEE-488.

system control and pass control capabilities. Other functions include service request, parallel or serial poll, device clear and trigger functions, automatic source and acceptor handshakes, and remote or local options with local lockout capabilities. Price: \$375. Dylon Corp, 3670 Ruffin Rd., San Diego, CA 92123, (714) 292-5584.

CIRCLE INQUIRY NO. 182

Alignment reference metal cassette for use in the calibrating of digital and word processing equipment is pre-recorded at 1600 flux changes per inch on an optical alignment recorder which employs precision magnetic heads. The magnetic tape used is especially made for the digital reference



tape application. These cassettes are available in several special configurations which allows them to be compatible with most OEM decks presently employed. Magnetic Information Systems, Inc. 415 Howe Ave., Shelton, CT 06484, (203) 735-6477.

CIRCLE INQUIRY NO. 183

Feeder/stacker for the Sprint 5 data terminals Speedfeed 5, is a single hopper feeder that automatically stores, inserts, ejects and stacks up to 220 sheets of paper in a variety of sizes. The electronics designed



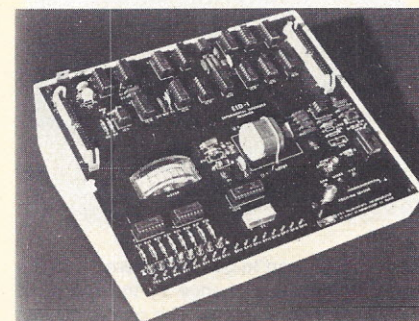
into the unit make it possible to use a single hopper feeder on the Qume data terminals. This allows the user greater flexibility for repetitive printing work. Installation may require upgrading of some systems by a service dealer. Price: \$1,000. Qume Corp., 2350 Qume Dr., San Jose, CA 95131, (408) 942-4000.

CIRCLE INQUIRY NO. 184

A/D + D/A card for Apple II is intended for applications in data acquisition and control. All functions are accomplished on one printed circuit card which occupies one peripheral slot. Its capabilities feature 16 channels analog to digital input, 16 channels digital to analog output. Noteworthy are super-fast 9μs conversion time permitting high-frequency applications and an 8 bit resolution. Mountain Computer, 300 Harvey W. Blvd., Santa Cruz, CA 95060, (408) 429-8600.

CIRCLE INQUIRY NO. 185

Analog interface accessory, EID-1, connects directly to MMD-1 and MMD-2 systems or other 8 bit microcomputers. The EID-1 features on board A to D and D to A functions for developing and simulating process control and other applications-oriented interfaces and software. The unit includes on board analog sensors such as light intensity,



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PROPERTY MANAGEMENT SYSTEM (PMS)

PMS is the most comprehensive income property management system developed for a microcomputer. It includes a full general ledger, accounts receivable (tenants), budgeting, checkwriter and many additional features. PMS was designed to meet IREM requirements. Price: \$650, demonstration diskette \$35.00

RESIDENTIAL PROPERTY MANAGEMENT (RPM)

RPM has most of the features of PAS but designed for one unit properties like houses or condominiums. One or several common checking accounts can be used. Price \$650.00, demonstration diskette and manual \$35.00

MINI-WAREHOUSES MANAGEMENT SYSTEM (MMS)

MMS has many of the PMS features but designed for one common general ledger. Each renter has his own file including home address for mailings. Price \$650

PROPERTY ANALYSIS SYSTEM (PAS)

PAS is a system for modeling and projecting cash flow, appreciation, tax considerations, future equity, etc. for all types of income properties. This program was designed for the sophisticated investor. Price \$250.00

All programs written in CBASIC under CP/M and compatible with TRS-80II. For additional information please contact:

A-T Enterprises • 221 N. Lois • La Habra, CA 90631 • 213/947-2762

temperature, and position, plus external analog input and output connections. A DC motor is included for motor control experiments. Digital inputs include one 8 position DIP switch and one 8 bit input port. Analog input levels are displayed on an analog output meter and their digital equivalents displayed on 8 color coded LEDs. Digital display output is latched and accessible for user interconnection to outside devices. The analog is available in kit form at \$175 and fully assembled at \$240. E&L Instruments, Inc., 61 1st St., Derby, CT 06418, (203) 735-8774, Telex 963536.

CIRCLE INQUIRY NO. 186

Graphics display capability for VT-100 or VT-103 terminals is possible with Graphics-100 PCB which fits into the option slot of the terminals and provides a 1220 x 240 dot resolution on the 8-inch x 4.5-inch screen. Normal terminal functions are separate and remain unchanged. The unit provides a separate display memory along with extensive text and graph labelling capabilities. The text includes 4 character sets, 3 text rotations for labelling, and 3 type fonts. Graphics-100 memory and VT-100 memory may be displayed simultaneously. The PCB includes a built-in vector generator. Users need only specify line endpoints anywhere in the 64K by 64K addressable areas. The unit



then computes the line, and displays that section of the line which lies within the designated viewing window. The viewing window may be moved programatically anywhere within the addressable space. Vectors may also be magnified, creating a software controlled zoom effect. Hardcopy is available from the Decwriter II using the Graphics II upgrade feature. A raster dump port is included for VT-100 screen dumps to the graphics Decwriter, or the user may connect the Decwriter with Graphics II directly to the host CPU. User programming of both CRT and hardcopy graphics is eased because of the command set compatibility of the two devices. Price: \$1,195. Selanar, 2403 De La Cruz Blvd., Santa Clara, CA 95050, (408) 727-2811.

CIRCLE INQUIRY NO. 187

Ascii encoded keyboard kit, JE610, can be interfaced into almost any computer system. The kit comes complete with a 62-key industrial grade keyboard switch assembly, integrated circuits, sockets, connector, electronic components and a double-sided circuit board. Complete step-by-step wiring instructions and circuit diagram are also included. The keyboard switches are spst mechanical action and 60 keys generate the full 128 characters, upper and lower case, of the Ascii set. Two user define keys are provided for custom applications. This



unit is fully buffered and there is a cap lock for upper case alpha characters. The heart of the system is a 40-pin ROM (AY5-2376) with outputs directly compatible with TTL/DTL or MOS logic arrays. The keyboard assembly requires +5vdc at 150ma and

- 12vdc at 10ma for operation. Interfacing is accomplished by a 16-pin dip or an 18-pin edge card connector. Prices: \$79.95 (less enclosure), available in kit only; \$49.95, the enclosure, model DTE-AK; both units, \$124.95. Jameco Electronics, 1355 Shoreway Rd., Belmont, CA 94002, (415) 592-8097.

CIRCLE INQUIRY NO. 188

Single-board computer, MBC/2, MBC/3, and MBC/SDX, are additions to the Micro-nova family. The MBC/2 and 3 provide a central processor, three types of memory, and a serial and parallel I/O on a single 7½ by 9½-inch board. They differ only in the size of their RAM capability (MBC/2 at 8K; MBC/3 at 32K). The MBC/SDX is a debugging aid as well as an I/O expansion interface, offering all the I/O features of the MBC/2. The SDX board is combined with an MP/100

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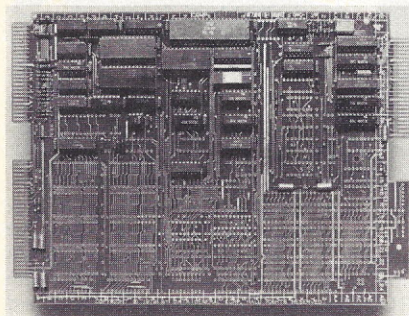
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CIRCLE INQUIRY NO. 54

or MP/200 central processor to act as an I/O interface. Runtime support is provided by the MP/OS operating system. Users can develop application programs using Pascal, Fortran or assembly languages under



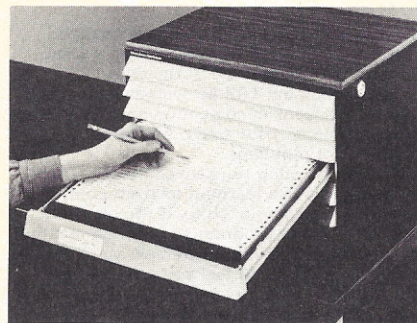
MP/OS, or on Eclipse computers under AOS. All three boards can be configured in a 4-slot card frame, as well as an 8-slot MP/100 or MP/200 chassis. Prices: MBC/2, \$1,200; MBC/3, 1,700; MBC/SDX, \$600. Data General, Route 9, Westboro, MA 01581, (617) 366-8911.

CIRCLE INQUIRY NO. 189

Music synthesizer, HA-8-2, includes a circuit board that plugs into the bus of the Heathkit H-8 computer, and the system software, supplied on a standard 5¼-inch floppy disk. The software allows any song to be entered into the system. The synthesizer board, which connects directly to any stereo system with two shielded cables, produces 27.5-6,600 Hz fundamental frequency response with up to nine harmonics. A H-8 computer with at least 24K memory, a floppy disk system and video terminal are required to use the music synthesizer. Price: \$159. Heath Co., Dept. 350-290, Benton Harbor, MI 49022.

CIRCLE INQUIRY NO. 190

Datadrawer organizes and files loose print-out. Each drawer holds up to one inch of records or 1,800 sheets. Drawers slide out at a reference angle and printouts may be bound in for security. Each drawer is removable and the built-in carrying handle allows



records to be carried. The drawers lock and can be stacked or placed side by side. Cabinets stand 18¼-inches x 15-inches x 10-inches high. Wilson Jones Co., 6150 Touhy Ave., Chicago, IL 60648.

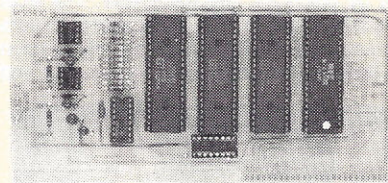
CIRCLE INQUIRY NO. 192

S-100 bus Z80 CPU board features: power on jump to on board 1K or 2K; Eprom that can be located on any 1K or 2K boundary;

usart with RS232 interface; reverse channel capability for buffered or unbuffered printers; baud rate selected from 110 to 9600; data output bus latched for improved 'write' data hold time and 2 MHz or 4 MHz clock speed. Circuit design provides the address quickly and minimizes data setup time required by the processor. Write data is latched an additional 125 Nsec at 4 MHz and 250 Nsec at 2 MHz operation. The reverse channel capability allows use of buffered or unbuffered printers. Prices range from \$190-\$240. Compu/time, P.O. Box 5343, Huntington Beach, CA 92646, (714) 536-5000.

CIRCLE INQUIRY NO. 191

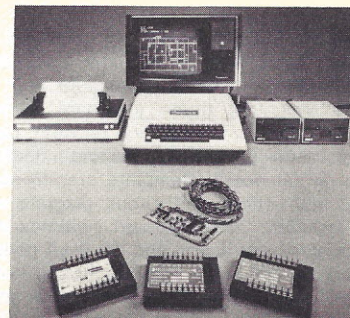
LSI board, Music Machine Nine can produce nine voices (three times that of similar products now on the market). The board uses three AY3-8910s and requires only one slot. It can use software now available to produce and play back nine-voice music compatible with other music boards. It will respond to



commands for pitch, amplitude, duration, attack, delay, etc. It will play music generated on other music boards and is compatible with Apple II bus structure. Two high impedance, low level outputs are provided with six voices assigned to each channel. Advanced Computer Products, 1310 E. Edinger, Santa Ana, CA 92705, (714) 558-8813.

CIRCLE INQUIRY NO. 193

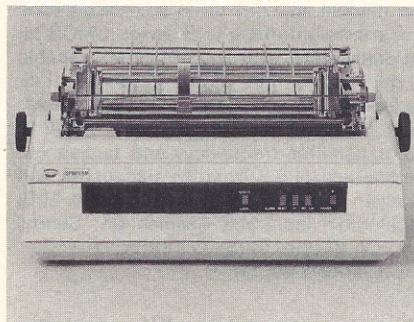
Remote multiplexing components may be controlled by an Apple II. The Minimax 800 series components make it easy for the user to design and install his own data acquisition and control system. Three different terminals and a special interface board make the components well suited to hundreds of applications: energy control of commercial and industrial facilities, remote site monitoring and/or control, lighting control, remote video switch and camera control, liquid storage tank gauging systems monitoring and control, industrial facilities manufacturing equipment monitoring and control systems, security



NOVEMBER 1980

and fire and safety systems. Introductory starter kits include: an RS232-C or Apple II interface unit, one 801 input/output terminal with eight discrete inputs and seven discrete outputs, and one 802 analog terminal with one input channel of eight bits resolution, and seven discrete outputs. Price: \$895. American Multiplex Systems, 1148 E. Elm Ave., Fullerton, CA 92801, (714) 870-5821. **CIRCLE INQUIRY NO. 194**

Proportional spacing for Sprinterm System Printers is an option for the PS-20KSR terminal and PS-10 printer. The option is not a software package, but a firmware package resident in the printer. It operates on a standard Ascii character code and does not require a special software driver in the proportional spacing mode. Price, with instructions



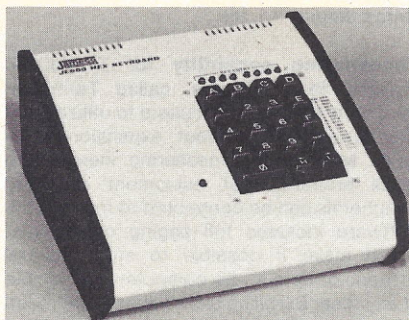
and one P.S. thimble, is \$250. Other standard features include: bi-directional printing, user selectable baud rates to 1200, interchangeable print fonts and an inreadable MTBF of over 2000 hours. Input Output Unlimited, 5922 Kester Ave., Van Nuys, CA 91411, (213) 997-7791. **CIRCLE INQUIRY NO. 195**

Auto vector card, model AV65, for use with the Rockwell AIM-65 passes program control from the monitor to user written code, immediately after power-up. User programs are automatically executed while retaining access to the Rockwell monitor. Turnkey applications are now possible without modification of the monitor. User programs (in ROM or Eprom) can be located in the basic or assembler ROM sockets. Operation requires no modification hardware. The 2.5 inch square card plugs directly into the computer. Price: \$29.95. Cubit, 2267 Old Middlefield Way, Mountain View, CA 94043, (415) 962-8237. **CIRCLE INQUIRY NO. 196**

Monitor debugger firmware packages MDB-6800 and MDB-6809 provide the PCU-6800 and soon to be released PCU-6809 single card computers with highly functional, easy-to-use software development tools. These user interactive packages plug directly onto the corresponding board and can be used from the initial system design and development phase through the production phase as part of the end product. In the 2K byte versions, the units incorporate these capabilities: examine and change memory contents, examine and change micro-processor register contents, set and remove breakpoints, run the target programs, load

memory, display memory contents, dump memory contents, move memory contents, and provide an offset feature allowing input of addresses in relocatable form. In its expanded 4K byte version, the MDB-6800 includes the powerful debug capability of disassembling each instruction during both single and multiple instruction trace calls. Price starts at \$85. Phoenix Digital Corp., 3027 N. 33rd Dr., Phoenix, AZ 85017, (602) 278-3591. **CIRCLE INQUIRY NO. 197**

19-key hexadecimal encoder kit, JE600, provides two separate hexadecimal digits produced from sequential key entries to allow direct programming for 8-bit micro-processor or 8-bit memory circuits. Three additional keys are provided for user define operations with one having a bistable output available. The outputs are latched and monitored with 9 LED readouts. Also included is a



debounce circuit for all 19 keys and a key entry strobe. Interfacing with other equipment is accomplished by way of 16-pin IC connector; only +5vdc is required. Prices: \$59.95 (less enclosure); enclosure only, \$44.95; \$99.95 for both units. Jameco Electronics, 1355 Shoreway Rd., Belmont, CA 94002, (415) 592-8097. **CIRCLE INQUIRY NO. 198**

Math ROM character set lets the Pet computer display mathematical formulas and expressions for scientific, technical, and educational use. In the graphics mode the computer operates normally, but in the lower-case mode all the graphics characters have been replaced by mathematical symbols. It can now display superscripts, subscripts, square roots, integrals, derivatives, sums, and much more. A foreign language ROM that contains the extra characters needed for German, French, Spanish, and Slavic languages is also available. Each ROM sells for \$75. West River Electronics R&D, P.O. Box 605, Stony Brook, NY 11790. **CIRCLE INQUIRY NO. 199**

CRT controller, S68045 is a ROM programmable device for pin-compatible replacement of software programmable CRT controllers at up to 40 percent lower price. It is designed to reduce the manufacturing cost of high volume intelligent CRT terminals, word processors and information display equipment. Terminals designed with the software programmable MC6845 and SY6545 can directly substitute the S68045 CRT controller once character fonts and display formats have been established. The unit stores two complete character and display programs in ROM. Using ROM in-

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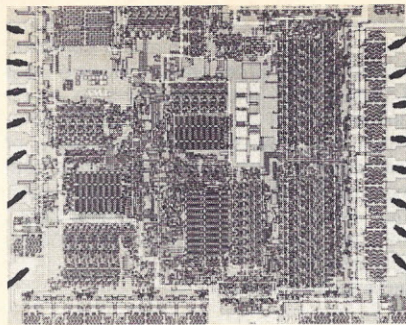
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CIRCLE INQUIRY NO. 28



stead of RAM, modulo-N counters instead of binary counters, and eliminating the light pen option, the controller reduces chip size and lowers price in high volume quantities. It utilizes the same power supplies and clocks. Price for a 250-piece minimum order in 40-pin packages is \$15 in plastic, \$20 in cerdip and \$25 in ceramic. American Microsystems, 3800 Homestead Rd., Santa Clara, CA 95051, (408) 246-0330, ext. 457.

CIRCLE INQUIRY NO. 200

Timesharing capability for TRS-80 is available in a package, called Termcom. Hardware allows Level II users to utilize time-sharing systems without expansion interfaces. Modems for timesharing, inexpensive serial printers, test equipment or other peripherals can be connected to the system. Software includes full paging capabilities, which make it possible to store several screens of data in the computer, accessible at any time. Scrolling allows lines to be rolled up or down off the screen, while still remaining instantly accessible in memory, ready to



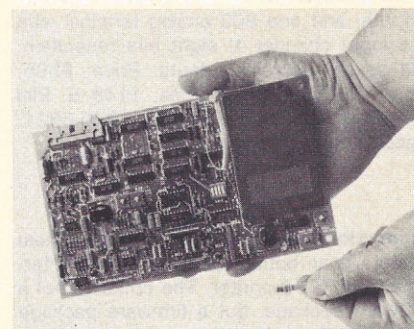
be called back to the screen. Wrap-on-blank capability is included for use with systems using 80-character lines so that long lines will break into two lines between words. The package makes it possible to lock information on the top or bottom of the screen while keeping the other portion free for normal use. Software is available in disk and cassette versions. Statcom Corp., 5758 Balcones Dr., Suite 202, Austin, TX 78731, (512) 451-0221.

CIRCLE INQUIRY NO. 201

OEM

Modem card, compact enough to fit inside data terminals, designed for switched network 300 bps full duplex operation. The VS300P is registered for direct-connect under FCC Rules, Part 68. The modem is fully compatible with Bell 103 and 113. Since all circuitry is contained on a 5-inch by 6.35-inch printed circuit board, which occupies less than 42 square inches of space, manufacturers can provide terminals with built-in direct-connect 300 bps modems. It is

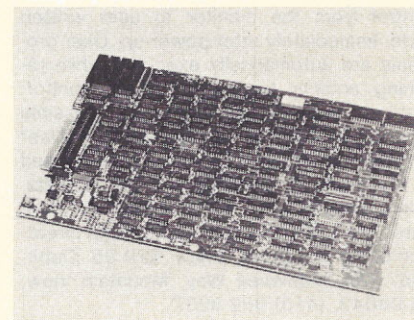
equipped with a telephone cable that plugs directly into telephone company data and voice jacks. The RS232C interface to the



terminal is via a 20-pin ribbon connector. The unit has the capability of pulse dialing with the dial-out pin and dial tone detector. The modem also has force answer capability. Terminal interface is B series CMOS input compatible, with output circuits capable of driving two TTL loads. Diagnostics include local test which connects the transmitter to the receiver, switches the receiver to the transmitter frequency, and busies out the line isolating it from the transmitter and receiver. Price: \$200 in quantities of 100. Racal-Vadic Inc., 222 Caspian Dr., Sunnyvale, CA 94086, (408) 774-0810.

CIRCLE INQUIRY NO. 202

Microprocessor-based disk controller with on-board data separator logic is capable of controlling up to four disk drives that can be any combination of Winchester fixed or floppy units. Designated SA 1400, the unit incorporates a significant amount of functional intelligence on-board to relieve host computers of many standard disk control functions with a resultant improvement in performance and overall system throughput. Among intelligence features are automatic copy, sector interleaving, error correction code autonomous to the CPU and optional microdiagnostics. Copying from one disk to

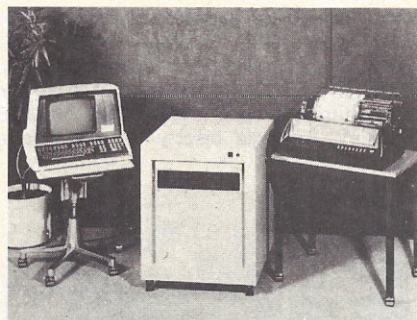


another is carried out by the controller logic with no need for CPU involvement. Data transfer between the controller and the host CPU is enhanced by sector buffering. The unit works with any combination of SA1000 8-inch or SA4000 14-inch Winchester drives and SA800/850 8-inch floppy disk drives. In the case of the 8-inch drives, this arrangement eases the retrofit of existing floppy disk based systems with Winchester disks, and the approach simplifies the combined Winchester-with-floppy-backup concept. The entire controller is on a single 8.25-inch by 13.70-inch circuit board. Power supply is +5 volts at 4.6 amps, -5 volts at 500 milliamps and +24 volts at 100 milliamps.

Shugart, 435 Oakmead Parkway, Sunnyvale, CA 94086, (408) 773-0100.

CIRCLE INQUIRY NO. 203

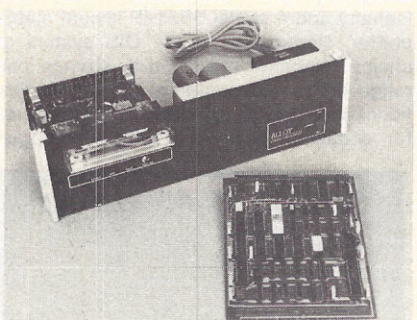
Z-80A based microcomputer, series 9000, comes complete with vectored interrupts, real time clock, 64K bytes of RAM, two RS232C serial ports, a 12-bit parallel port, an integral disk controller, all on two S-100 cards. The four models of the series allow various combinations of storage from twin double-sided mini floppies to double-sided 8-inch floppies to a 19-megabyte Winchester hard disk. The large system cabinet provides for future upgradability and expansion while maintaining a professional office



appearance. Standard systems software include the CP/M 2.2 operating system, a resident monitor with system diagnostics and various utilities. Languages available include CBasic II, Fortran IV, Cobol, Pascal, APL, C Compiler and PL/1. To support OEMs, quick deliveries, a one year warranty, technical assistance and service training are offered. Computerworld, One Scarsdale Rd., Don Mills, Ontario, Canada M3B 2R2, (416) 445-2015.

CIRCLE INQUIRY NO. 204

Cartridge tape subsystem, DMN-1, for Micronova computers features a 14 mb storage capacity with a .9 mb/min. recording rate to provide an ideal medium for Winchester back-up, tape spooling, or other mass storage requirements. Fully supported under DOS and Iris, it emulates the Nova 4030 series magnetic tape system. Incorporating dual 6400 BPI.30 IPS D.E.I. Data Funnel



tape drives, the 8085 based subsystem operates at a 20K char./sec. DMA transfer rate. Using 1 controller slot, the unit requires only 5 1/4-inch of vertical mounting space and is equipped with Nova trim. It is priced at \$2,600 in quantities of 25 in-

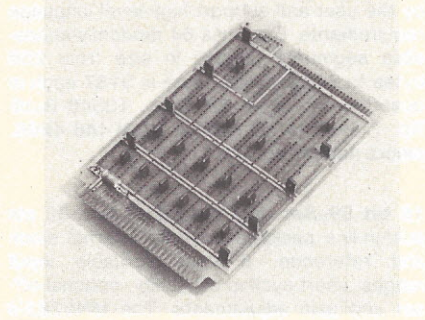
cluding controller, tape drive, power supply, and software license. Alloy Engineering Co., 85 Speen St., Framingham, MA 01701, (617) 620-1710.

CIRCLE INQUIRY NO. 206

High-dot color graphic system offers a new terminal, model CG3999, with 512 by 512 dot resolution, 19-inch standard resolution tube, a full color 60-Hertz non-interlaced monitor, and Z-80 microprocessor with full refresh RAM memory. The base price will be \$7,995, but will drop sharply to \$5,995 for 100-piece OEM quantities. The model is available with optional keyboard, extra card cage and blink plane—options that are not usually required for process control applications. Chromatics, Inc., 3923 Oakcliff Industrial Ct., Atlanta, GA 30340

CIRCLE INQUIRY NO. 205

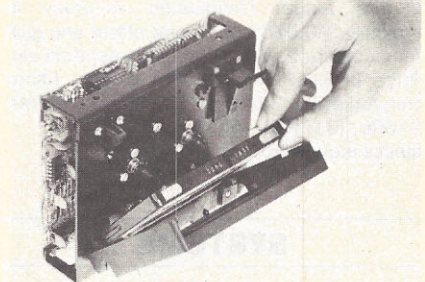
Wire-wrap card for the STD bus system offers: power and ground busing to every IC with bypass capacitors, wire-wrap feed-through posts at the edge connector, 50 position mass termination connector on



front edge as well as 4 test points. Cost is \$51 each in 10 lot quantities. Baradine Products, P.O. Box 86757, North Vancouver, B.C. Canada, V7L 4L3, (604) 988-9853.

CIRCLE INQUIRY NO. 209

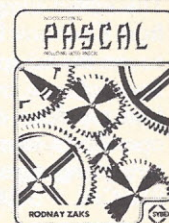
Digital tape transport line features drop-in cassette loading systems. The double-track models 450C and 452C, as well as single-track models 250C and 250CH, provide a spring-loaded door; special hubs automatically align the cassette in the proper position. The door that snaps shut has a viewing port that lets the operator observe the tape's progress. To eject the cassette,



the door latch lever is pressed. The single-track model transports hold up to 360,000 bytes, and are offered in the BH configuration for hostile environments from -40° Centigrade to +70°C. The dual-track models store up to 720,000 bytes. MFE Corp., Keewaydin Dr., Salem, NH 03079, (603) 893-1921

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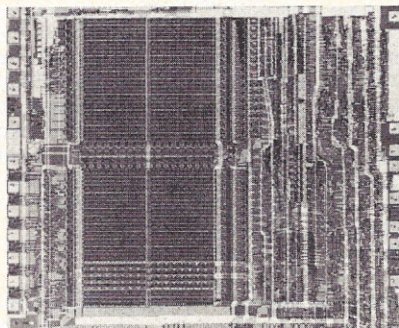
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From Missouri, call 1-800-892-7655, ext. 302.

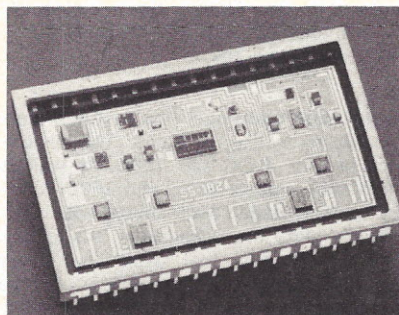
Memory management unit for the Z8000 microprocessor family offers segment relocation and numerous memory protection features for each of the Z8000 CPU's 8-megabyte address spaces. The Z8010 unit is designed to: provide memory space with a logical structure that is independent of the data's physical location; protect the user from inadvertent errors; prevent the



user from gaining unauthorized access to memory resources or data; protect the operating system from unexpected access by the user and support high-level language requirements. Each has 64 randomly-accessible segments ranging in size from 256 bytes to 64 kilobytes. Price is \$187 each in quantities of 10 to 99. Zilog, 10340 Bubb Rd., Cupertino, CA 95014, (408) 446-4666.

CIRCLE INQUIRY NO. 212

16 bit 50 μ Sec A/D converter in a 32 pin dual-in-line package features internal clock and reference, 6 user-selectable input ranges, short cycling capability, optional offset and gain adjustments. The MN5282's linearity is better than $\pm 0.003\%$ FSR at $+25^\circ\text{C}$ and better than $\pm 0.006\%$ FSR over the entire 0°C to $+70^\circ\text{C}$ operating temp-



erature range. Unadjusted accuracy is typically $\pm 0.075\%$ FSR and offset and gain tempcos are 2 and 10 ppm/ $^\circ\text{C}$ respectively. Price is \$187 for 100-249 pieces. Micro Networks Co., 324 Clark St., Worcester, MA 01606, (617) 852-5400.

CIRCLE INQUIRY NO. 215

SYSTEMS

Sound, music and voice output capability via a digital to analog converter is offered with the C1P series 2 computers. With modem interface, the systems can be used as an economical remote terminal in conjunction with timeshare services. It is also useful as a scientific calculator with its floating point math capability and immediate mode operation. The mini-floppy version, C1P MF series 2, comes with two disk

operating system which allows the use of OS-65D, a business and development oriented system. Both series are expandable via the 630 I/O expander to provide color, dual joystick operation, dual remote 10-keypad operation, A.C. remote control interface, programmable sound generator, program selectable modem and high speed ports, and an interface for complete home security. The C1P series computer is priced at \$479 and the MF series computer is priced at \$1,279. Ohio Scientific, 1333 Chillicothe Rd., Aurora, OH 44202, (800) 321-6850.

CIRCLE INQUIRY NO. 218

Single-station microcomputer, CS/10, can expand to four terminals and support up to 50MB of disc storage. The system runs an interactive version of the Ansi '74 Cobol language. Typical applications include order entry processing, inventory control and general accounting. The system can run 2780/3780 emulation software. Two models are offered: Mod C1 has 64KB of MOS memory, a single display terminal and a



choice of a 2.4MB storage diskette system, or a 12.5MB or 25MB Winchester disc with integral diskette. Hard copy options range from a 60cps or a 180cps matrix printer to a 55cps letter-quality printer or a 300lpm line printer. The Mod C3 has a 128KB and can support up to three additional displays and two 25MB disc subsystems. Data General, Route 9, Westboro, MA 01581, (617) 366-8911.

CIRCLE INQUIRY NO. 219

CRT disk-based text processor, Ideographic word processing system, is used to create, edit and print documents in conventional or simplified Chinese, Japanese or English. The basic configuration consists of a master Office Information System processor with a single diskette drive, a model 5536-IWS CRT workstation with 64K memory and a model 5531-IP impact matrix printer. Depending on the OIS system of choice, standard system disk storage can range up to 137.5 million characters. Optional disk capacity, available on all systems for document back-up, additional storage,



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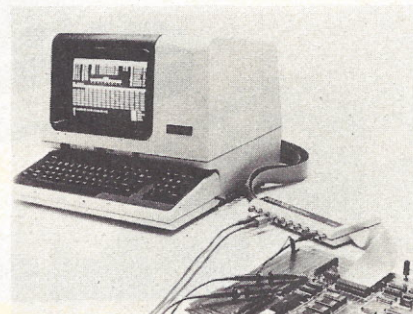
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and archiving, is available. Operational features include standard text movement, copy, search, replace, automatic centering, right margin justification, tabbing, and forward and reverse vertical scroll. Editing capabilities include insertion, replacement, deletion of characters, lines, paragraphs or entire sections of text. Wang Laboratories, Inc., One Industrial Ave., Lowell, MA 01851, (617) 459-5000.

CIRCLE INQUIRY NO. 220

Universal development system with the capability to emulate any microprocessor (μ P), from any family, from 4- to 32-bits, in real time. The ECL-3211 provides in-circuit emulation of chips at up to 30 MHz and is available for stand-alone or down-loaded applications. The system utilizes a software-driven approach so that hardware does not have to be installed every time a new chip is introduced—load the software for the new chip and plug in an adapter card for the chip family. In multi-user applications, up to 64 stations may be tied together in any combina-



tion of software development and in-circuit emulation stations. The basic system includes an LSI 11/2 CPU, 64K bytes of 210 ns RAM (expandable to 256K bytes), 1Mbyte double density dual floppy disk, a 512 x 64-bit trace buffer, a VT103 terminal with full screen display and keypad editor, DEC RT-11 operating system and software, full hardware/software emulation support for any one chip family, and is priced at \$23,990. Emulogic Inc., 362 University Ave., Westwood, MA 02090, (617) 329-1031.

CIRCLE INQUIRY NO. 221

Multi-user computer, OSM model 6300, has its own CPU, memory, I/O and shares a common database of disk storage of up to 128 Mbytes, using CP/M 2.2 and DPOS/2, a multi-user executive. A service processor, consisting of a complete system—Z80A CPU, RAM, I/O—routes communications from the user processors to the disk database and system printer. User hardware consists of Z80 CPU, 64K memory, console I/O and optional local printer. Each user runs on its own CP/M 2.2 disk operating system thus allowing all CP/M compatible software to be used without modification. Communication between user and service CPU is handled via a 16-bit inter-processor communication channel not through the S-100 bus. The system comes with two 8-inch double density floppy disk drives. Single user mainframe is priced at \$5,195. OSM Computer Corp., 2364 Walsh Ave., Santa Clara, CA 95051, (408) 496-6910.

CIRCLE INQUIRY NO. 222

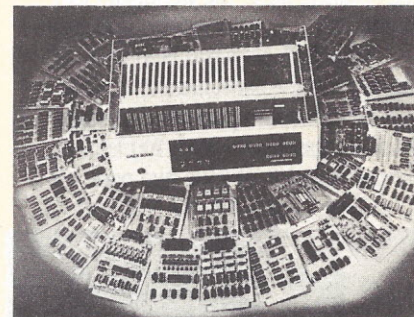
64K table top computer, the SD-700, includes a high speed 32mb fixed/removable disk, which can be expanded to a maximum of 96mb. In its multi-user configurations, the system supports up to five users with user partitions of 48K and a 16K operating system with a maximum memory capacity of 256K. The disk features fast access times with average access times of 30 milliseconds and a maximum of 55 milliseconds.



The standard configuration offered provides two Z-80 central microprocessors operating at a 4MHz CPU speed and two I/O ports. Included also is a Communications Oriented Multi-user Operating System. COSMOS supports CP/M compatibility, Cobol, MBasic, CBasic and other compilers, and individual and shared files for multi-user applications. SD Systems, 3401 Kingsley, Garland, TX 75041, (214) 271-4667.

CIRCLE INQUIRY NO. 223

Modular design micro makes system configuration rapid and straightforward. The heart of the DACS 5000 is a powerful Cyberbus, featuring a 16-bit data bus, DMA, vectored interrupt, memory mapped I/O, low cross-talk, high noise resistance, and other advanced features. The power supply, front



panel and cards plug into the Cyberbus. Basic systems feature CPU, 2K Eprom, 32K static RAM and interfaces to all system peripherals. Prices range from \$1,200 to \$9,500. Cybersystems, Inc., 8300 Whitesburg Dr., Huntsville, AL 35802, (205) 883-4410.

CIRCLE INQUIRY NO. 224

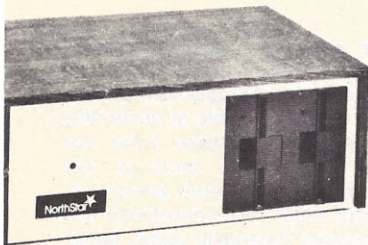
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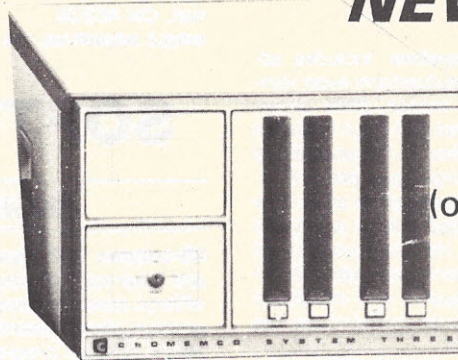
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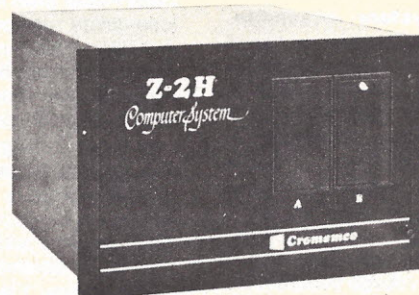
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sulting, 1719 S. Carmelina Ave., Los Angeles, CA 90025, (213) 820-4231.

CIRCLE INQUIRY NO. 225

Customized micro system includes advanced utilities which outperform even mini-computer systems: a screen utility allows free formatting of prompt and input fields; an input utility then operates on the predefined fields to control user input and prevent errors. The system is structured to allow new programs to be generated quickly and easily from existing software. Hardware consists of a modular design mainframe with an industrial grade power supply and expansion capability to twenty cards. Included are the



CPU card based on the Zilog microprocessor, 64K user RAM and 1K diagnostic Prom, peripheral interfacing for two serial devices and two or more parallel devices, and a double density disk controller. The twin 8-inch disk drives give the system up to 2.4 megabytes of fast mass storage. The four function CRT displays 80 characters by 24 lines. Data-tronics, 1671 Timmy Dr., Hamilton, OH 45011, (513) 874-0001.

CIRCLE INQUIRY NO. 226

Pascal graphics system ensemble, 120GX, is a self-contained system packaged in a configuration that might easily be mistaken for a terminal. Standard versions are based upon the Western Digital Pascal Microengine, high resolution graphics, a 15-inch monitor, 12-slot S-100 standard motherboard, detachable keyboard, double density, double-sided dual floppy disk subsystem, Z80 alternate on-board MPU, memory parity, 128KB dynamic RAM, UCSD Pascal, CP/M, constant voltage transformer, and printer port for graphics hard copy output. Price: \$9,796. Iris, 10150 Sorrento Valley Rd., Suite 320, San Diego, CA 92121, (714) 457-3730.

CIRCLE INQUIRY NO. 227

Distributed database and processing system, CDPS, supports expanded memory systems up to 256K allowing more programs

to be resident at once, improving response time and enabling support of more work stations. The compiler has been enhanced and features expanded numeric functions; new compile options and 'include' statement support; increased flexibility in the compilation of variables, roots and overlay members and additional cross-reference and diagnostics. CDPS is available in two packages. The first offers complete application development activity and all utilities necessary for application development. Price: \$10,500. The second offers control over an application end user environment, containing only end user-oriented utilities that directly and tutorially support the application use. Price: \$5,000. Tominy, Inc., 4152 Crossgate Dr., Cincinnati, OH 45236.

CIRCLE INQUIRY NO. 228

SOFTWARE

BUSINESS

80-column WP system provides upper- and lower-case display and printout for Apple without computer modification or adding expensive circuit boards. The user loads the Magic Window program and uses the computer keyboard as though it were a typewriter. The program allows computer-assisted



text editing and correction, and includes sophisticated word processing capabilities. Artsci, Inc., 10432 Burbank Blvd., N. Hollywood, CA 91601, (213) 985-2922.

CIRCLE INQUIRY NO. 229

Land surveying programs for TRS-80 include Finder (field note data reduction), Cogo (coordinate geometry), Stadia Reduction, and Horizontal Curve Staking. Programs are designed for the first-time and experienced computer user alike; no computer knowledge is presupposed. Steps are presented logically and lucidly. Programs are supported by manuals which guide the user step-by-step through hardware installation, data entry, computation, and output, reinforced by practical examples and appendices which treat common problems and care of magnetic media. Prices: Finder: \$250; Cogo: \$350; Together: \$500. Stadia Reduction: \$175; Horizontal Curve Staking: \$95. Disco-Tech, Morton Technologies, Inc., Box 11129, Santa Rosa, CA 95406, (707) 523-1600.

CIRCLE INQUIRY NO. 230

Word processing and data entry program, Capdoc/M, that runs efficiently under

both single and multi-user operating systems, combines word processing and batch mode data entry. Operators can create a data entry form on screen; then call up any number of forms to be filled out in batch. The data can then be stripped out of the form; stored as a sequential text file, and merged with other text files—all without leaving the word processing program. The program operates under MP/M. It comes complete with special utilities and training modules for \$395. A similar version, Capdoc 4.0, operating under single user CP/M, sells for \$350. Monoson Microsystems, 51 Main St., Watertown, MA 02172, (617) 924-2124.

CIRCLE INQUIRY NO. 231

Accounting package called Accounting Plus includes these features: 1) fully integrated, as many as 11 data files are updated at one time; 2) capable of generating 35 reports including purchase order and sales order confirmation, backlogs and analysis; inventory stock status, physical inventory listing, order recommendation and analysis; accounts receivable aging, detail, invoicing and statements; accounts payable aging, detail and check printing; general ledger detail journal; income statement, and balance sheet; 3) self-prompting with a high level of input error checking (end user oriented); 4) fully menu driven; 5) written in CBasic for CP/M, MP/M or CDOS systems. System Plus, 1921 Rock St., Suite 2, Mountain View, CA 94043, (415) 969-7047.

CIRCLE INQUIRY NO. 232

Accountant software called Master Accountant Business System is for CP/M compatible systems. The payroll system allows preparation of periodic payroll for hourly, salaried, and commissioned employees while accumulating the necessary information for tax reporting. It generates the monthly, quarterly, and annual returns to be filed with local, state and federal governments. It also prepares W-2s and maintains an information reference for each employee. It is designed to interface with the Master Accountant general ledger system providing automatic monthly journal entries. Also available are accounts receivable, accounts payable, and general ledger. All software is written in Microsoft Disk Basic and is available on 8-inch soft sector diskettes. Each package costs \$100, the manuals are \$25, and a special demo package with manual is \$50. Computer Services, P.O. Box 2292, Hickory, N.C. 28601, (704) 294-1616.

CIRCLE INQUIRY NO. 233

Word processing capability, Star Text, has been added to the F-85 desk-top, business system. Features include quick text entry, easy editing and flexible printing options, complete document library facilities, and the capability to generate repetitive letters. The system combines the advantages of a stand-alone word processor with a powerful business computer. Software accomplishes invoicing, stock control, improved cash management, and other clerical accounting functions for small and medium-sized companies. Durango Systems, 3003 N. 1st St., San Jose, CA (408) 946-5000.

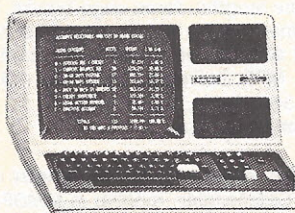
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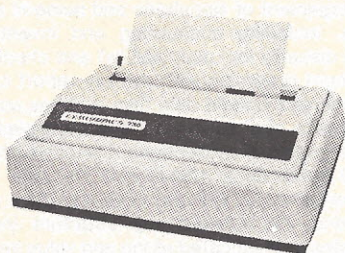


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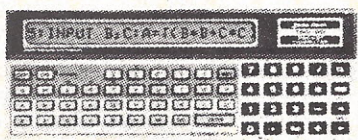
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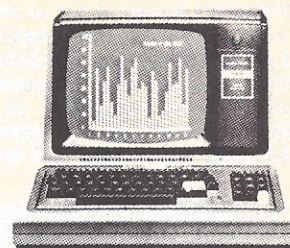
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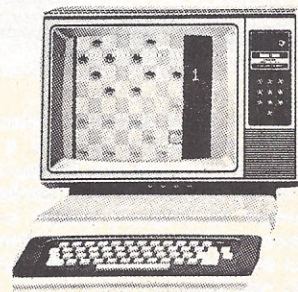
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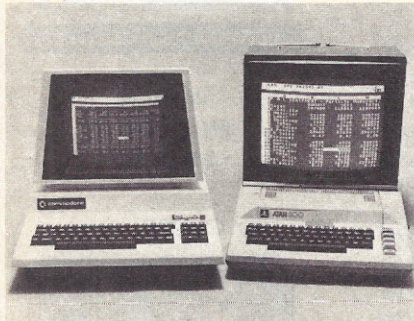
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Interactive electronic worksheet, Visicalc, creates a 64-column wide, 254-row high matrix on the screen. It can be used instead of a calculator, pencil and paper to speed and simplify repetitious calculations like inventory planning, sales forecasts, financial analyses, and modeling of physical phenomena. It will run on Commodore Pet, CBM model 8032, Atari 800 and Apple II.



computers. Each package contains an instruction manual that includes a step-by-step tutorial for first-time computer users, and an expanded reference section that is organized by program feature to aid experienced users. Personal Software Inc., 1330 Bordeaux Dr., Sunnyvale, CA 94086, (408) 745-7841.

CIRCLE INQUIRY NO. 234

Computerized post office is useful in remote modem or multi-user computer systems. Ease of operation is accomplished by prompting the user through each function. Features include: box configuration, security, line editor, bulletin line, dynamic file allocation, and special operator commands. Program is supplied on an 8-inch single density CP/M 2.0/MPM compatible diskette. Price: \$50. Provar, Inc., Box 2280, 6217 Kennedy Ave., Hammond, IN 46323, (312) 374-7335.

CIRCLE INQUIRY NO. 236

Business package, L216, for TRS-80 systems with 16K memory and level II Basic consists of a cassette data base manager, a word processor, an inventory control system, a stock management program, a check balancing program, a label printer, a deposit calculator, a statistics program, a sort utility, and a key access utility. The two utilities can be included as part of the user's program. Price: \$59 including postage and documentation. Micro Architect Inc., 96 Dothan St., Arlington, MA 02174, (617) 643-4713.

CIRCLE INQUIRY NO. 237

Integrated business packages, designed for use with North Star Horizon include general ledger, accounts receivable and accounts payable. Each package has been completely tested in actual business use and comes with thorough instruction manuals. North Star Computers, 1440 4th St., Berkeley, CA 94710, (415) 527-6950, TWX/Telex 910-366-7001.

CIRCLE INQUIRY NO. 238

Mailing lists system, Ultimail, requires a 48K TRS-80 I with two disk drives. The program uses sequential disk files and holds up to 250 fifty addresses per file. Addresses

can be three, four, or five lines. A key field is used to order alpha printouts of the file and to locate addresses in the file. Addresses can also be accessed by any part of the record. The system uses a machine sort to order zip codes and alpha keys in ascending order in less than three seconds. Users can specify any quantity of labels per address. The machine sort and printer driver is set for parallel printers using the parallel printer port on the Radio Shack expansion interface. Each address may have up to thirty characters per line on three, four, or five lines. The usual address is less than 100 characters spread over three lines. This latest version providing better data input routines and a faster sort routine, is supplied on a TRSDOS formatted diskette with a sample file. Price: \$49.95. Computer Generated Data, 700 Baker Rd., Suite 115, Virginia Beach, VA 23462, (804) 497-1165.

CIRCLE INQUIRY NO. 239

Office appointment calendar, Datebook, maintains a record of appointments for up to three people (or three rooms), for an unlimited time. It is ideal for doctors, dentists, lawyers, salesmen, repairmen, or in any situation where time management is critical to office efficiency. The program was written for people with no computer background. It is easy to learn by an inexperienced receptionist, yet fast and efficient for an experienced professional. All operator entries are checked for validity to eliminate errors. The data is stored on disk, but a condensed calendar is kept in memory for fast access to the limited information needed for searching for appointment openings. It is written in Pascal and is available to run on CP/M and its derivatives, as well as UCSD Pascal systems. Price: \$295. Organic Software, 1492 Windsor Way, Livermore, CA 94550, (415) 455-4034.

CIRCLE INQUIRY NO. 240

ISAM file handling routine for Commodore 2040 disk drive uses 2K bytes of assembly language subroutines and supports these functions: create a new file; open an old file; read key and data from a file; write key and data to a file; read next key and data from file; delete a specific key and data from a file; and close the file. The software supports up to five open files at once and will run on any 16K or 32K CBM 2001 computer. Versions are available for the CMB 8016 and 8032 computers using the model 8050 disk drive. Price: \$99.95 plus \$2.50 shipping (diskette only). Creative Software, P.O. Box 4030, Mountain View, CA 94040.

CIRCLE INQUIRY NO. 241

Business database system for TRS-80 allows the user to define and build databases for such purposes as inventory control, general ledger accounting, accounts receivable and accounts payable. The fields may be manipulated with the exclusive CMA math formula accumulator to format reports and present status displays. The system allows the filing of report formats for later use, and printing on most compatible printers. All data may be searched, sorted and displayed. The system is compatible with Trsdos, Newdos and 3.0 DOS. The programs are auto linked and called automatical-

ly as needed full user driven menu control. The system needs 32K or RAM (48K recommended) and a single disk drive. Multiple disk systems are fully supported under user control. Price: \$89.95. Charles Mann & Assoc., 7594 San Remo Trail, Yucca Valley, CA 92284, (714) 365-9718.

CIRCLE INQUIRY NO. 242

Full-feature word processing system, Wordscribe, for the models I and II TRS-80, includes full-editing features of release 1.1 and utilizes a powerful full-screen editor that contains many features of large system text editors, yet remains simple to use. Features include document chaining allowing the user to load more than one document at a time for merging documents and inserting standard blocks of text, formatting commands to change line lengths, force page breaks, and change line spacing within a body of text. Priced at \$79.95 for model I, \$129.95 for model II. MPS Software, 11223 E. 45 St. So., No. 314, Tulsa, OK 74145.

CIRCLE INQUIRY NO. 243

Interactive database management system, the Datahandler, running in MMSForth on the TRS-80 I with at least 32K RAM and one minidisk drive, can specify up to 10 data fields appropriate to each particular job. Standard and special report formats can be output to screen and printer. It solve a variety of personal and professional tasks such as management of alphabetic and numeric data files, including accounting and inventory. The diskette includes mail list and checking account programs with custom report commands and sample data files, both as useful products and as informative examples of other practical applications. Typical multiple-field sorts on a 100-record file take five seconds, while look-ups take less than one second. An indexed key structure incorporates sophisticated string and value selection mechanisms including normal compares and values inside or outside a range. System costs \$59.90 including PEMS manual. Miller Microcomputer Services, 61 Lake Shore Rd., Natick, MA 01760, (617) 653-6136.

CIRCLE INQUIRY NO. 244

Farm management system is a software package designed specifically for agribusiness applications which include farm ledger and farm payroll run separately or chained together. Farm ledger capabilities provide balance sheet, profit and loss, detailed expense and cost center breakdowns. Single or double entry options are available. Farm payroll processes payroll information, prints checks, and may be used to prepare commonly used reports such as unemployment and withholding. CPU, 2151 Davcor St. SE, Salem, OR 97302, (503) 363-8929.

CIRCLE INQUIRY NO. 245

RAM-resident text editor and assembler, EDAS 4.0, for the TRS-80 II provides text editing facilities for the modification of alphanumeric text files. Command syntax is identical to the disk Basic editor and offers text block move, global change, string search, and line scroll capabilities. The assembler portion facilitates the translation of Z-80 symbolic language source code programs into machine executable code. Assembler switches provide the user with options to suppress source and symbol table listings, suppress object code generation, output the

assembled code directly to memory or disk, and more. 'Trsdos' commands are directly executable from within, giving the capability of displaying directories, listing files, setting 'forms', or any other command without exiting the environment. Available for \$229. Galactic Software Ltd., 11520 N. Port Washington Rd., Mequon, WI 53092.

CIRCLE INQUIRY NO. 246

File management system for storing, classifying, manipulating, and retrieving data in the Apple II, Filemaster II, is comprised of four Applesoft programs. File designer is a step-by-step, menu-driven guide for developing the structure of the information; search & retrieval, for entering data and retrieving records by logical 'and', 'or', 'nor', and 'nand' searching; sort information, providing the required input for use with the Single Disk Sort by Datacope; and file converter, a process for converting old files into the new format. Special features include: computed numeric fields from user-entered formulas; totaling of numeric fields from records retrieved in a search; tallying of a given class of records in a file; provisions for creating a sub-file onto a second disk; retrieval of both active and non-active records; output formatting and printer control. Price: \$99.50. Rainbow Computing, Inc., Garden Plaza Shopping Center, 9719 Reseda Blvd., Northridge, CA 91324, (213) 349-5560.

CIRCLE INQUIRY NO. 247

Data entry software, Datastar, designed for high-volume production by clerk typists, is a forms-control oriented, general purpose data entry, retrieval, and update system.

Performing arithmetic calculations and automatically inputting the results into data-fields, it eliminates later processing previously required to obtain the same result. Operator accuracy is improved because thorough control is provided by visual feedback over forms design, individual field length and recording attributes, data entry order, data verify procedures and record format. It will support virtually any hardware combination that uses CP/M, MP/M or similar operating system derived from them. Price: \$350. Micropro Intl. Corp., 1299 4th St., San Rafael, CA 94901, (415) 457-8990.

CIRCLE INQUIRY NO. 248

Inventory control system, INV-M2, for the TRS-80 mod-II provides control functions to allow the user to maintain an efficient inventory system with improved service. It is on-line, interactive, menu-driven and human engineered. Order Report gives all the inventory items at or below the safety levels and the associated order information, such as the order quantity, the vendor code, and the total amount in dollars. Performance Report provides the tools to measure the efficiency of the inventory system and the associated costs. Management Report gives an instant summary of the inventory system, such as the total inventory cost, annual sales, cumulative numbers of times of inventory items out-of-stock or below or at safety levels, total received sales tax, total received shipping charges, etc. Other reports include data base lister and end-of-year processor, which also calculates economical order quantity and compares to the current order quantity. A search command can be

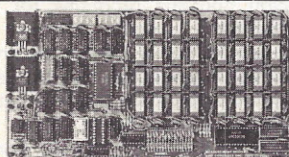
used to search any record on-line with a filter criterion. Price: \$149. Micro Architect Inc., 96 Dothan St., Arlington, MA 02174, (617) 643-4713.

CIRCLE INQUIRY NO. 249

Client posting and accounting package is a multi-company general ledger primarily targeted to accountant and service bureaus who are engaged in client writeup. Features include: multi-level password protection, department balance sheet and income statement, prior year and budget comparisons, cash flow statement, statement of financial charges, subsidiary schedules, flexible chart of accounts setup and report formatting options, depreciation/amortization schedules, user-definable statement footnotes, and auto-repeating and auto-reversing journal entry types. The package is in Microsoft Basic coupled with Miksam File Manager. Hardware requirements are any 8080, Z80, or 8085 microcomputer with 48K RAM, two disk drives, CRT, and 132 column printer. Peachtree Software, Suite 700, 3 Corporate Square, Atlanta, GA 30329, (404) 325-8533.

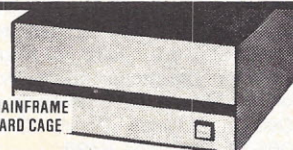
CIRCLE INQUIRY NO. 250

Accounts receivable program for TRS-80 requires 48K memory and 2 disk drives. The system provides daily postings, customer file maintenance, trailing journals with hash totals & run totals, itemized statements, sales journals, sorts, periodic reports of account status, screen inquiry of individual account status & output to printer options. The program is self prompting with end users in mind. Specific jobs are menu controlled, and



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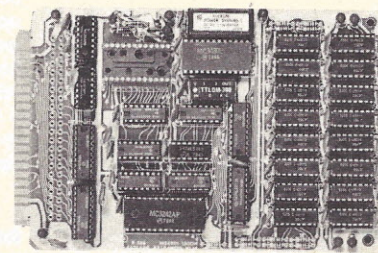
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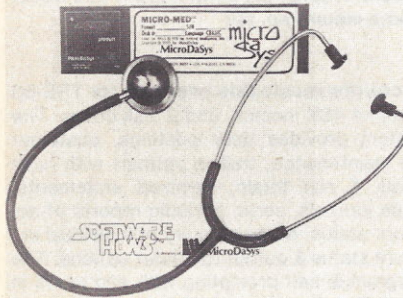
can be modified for specific need. Accounting Services, 2895 Bedford Ave., Placerville, CA 95667.

CIRCLE INQUIRY NO. 251

Mail list for the Commodore CBM 16K and 32K computers with CBM 2040 disk drives and CBM or Ascii printers is a user-oriented program which makes the preparation and organization of mailing list labels easy, storing 1,050 records on a single disk. Mailing labels can be printed out according to alphabetical or zip code order. Records can be identified and selected as active or inactive according to a user-designated utility field. Price: \$95. CDS Corp., 695 E. 10th N., Logan, UT 84321, (801) 753-6990.

CIRCLE INQUIRY NO. 252

Medical billing system, Micromed, automates billing procedures, improves turnaround of insurance form processing, and provides mail-list and information processing for patient records. It keeps track of services rendered, bills patients and/or in-



surance organizations, and prepares statements. It handles any number of insurance forms types and patients can be covered by several insurance plans. Price: \$995. Software Hows, Box 36275, Los Angeles, CA 90036, (213) 731-0877.

CIRCLE INQUIRY NO. 253

Patient statistics software for nursing homes and long-term care facilities includes systems for patient statistics, accounts receivable, accounts payable, inventory, payroll, general ledger, checking account and patient spending accounts. The software operates on various micros and peripheral equipment using a CP/M or CP/M-compatible operating system with at least 64K of RAM and one megabyte of storage capacity. Brook Chambery, Beechwood Software Div., 900 Culver Rd., Rochester, NY 14609.

CIRCLE INQUIRY NO. 254

Job costing package consists of three systems: a reporting facility, a job costing accounts payable, and a job costing payroll. They are designed to run on a Z80 or 8080 processor using CP/M or other CP/M like systems. The software will run on hard or floppy disks (5.25 double or quad density or 8-inch single or double density). All applications are completely integrated, yet each system may be run as a stand-alone package. Experience is necessary to operate the systems. Price: \$700. Arkansas Systems, Inc., Suite 206, 8901 Kanis Road, Little Rock, AR 72205, (501) 227-8471.

CIRCLE INQUIRY NO. 255

Distributor accounting system is designed to replace manual accounting machines in-

cluding the Borrough F and L series and the NCR 31, 32, 33, 36, 395 and 399 series. It is a menu-driven system including order entry, inventory control, invoicing, accounts receivable, sales analysis, accounts payable, general ledger and payroll. A unique feature is the Update data base management system that allows the user to create customer data files and business reports avoiding costly programming efforts. It operates on Microstar line of business systems. Micro V Corp., 17791 Sky Park Circle, Irvine, CA 92714.

CIRCLE INQUIRY NO. 256

List management system, Ultimail version 5, is written for TRS-80 model I computers with 48K RAM. Two mini-disks or one 8-inch floppy disk are required for program operation. It uses random disk files and stores 650 records on a mini-disk, or 1,000 records on an 8-inch floppy disk. Program routines are: data entry, database—record display, edit, delete, directory—in alpha order, labels - zip code and non-zip code order with one to four up labels and any number of labels printed per each address in the file. The system consists of the program, a machine sort program, and a utility program for printing three and four up labels. Programming is set for the standard 3-1/2 by 15/16-inch mailing label. Price: \$124.95. Computer Generated Data, 5541 Parliament Dr., Suite 208, Virginia Beach, VA 23462, (804) 497-1165.

CIRCLE INQUIRY NO. 257

The Dow Jones connection, a stock management system, interfaces the TRS-80 to the Dow Jones computer in Princeton, NJ. Interaction with the Dow Jones network is automatic and virtually instantaneous. The system requires a TRS-80 model I disk system with at least 32K of memory. To access the computer over the national telephone network, a micro connection is also required. This device is a direct connect telephone interface which eliminates the need for both the RS-232 adapter and acoustic coupler. The Connection has an RS-232 output which can be used to drive a serial printer. Micropipheral Corp., Box 529, Mercer Is., WA 98040, (206) 454-3303.

CIRCLE INQUIRY NO. 258

Application software from American Business Systems is now available to Oasis users. The operating system runs on 25 computer systems including Cromemco, Dynabyte and Onyx systems. In addition to a set of integrated financial packages (accounts payable, accounts receivable, general ledger, payroll, and order entry/inventory control) industry-specific packages are provided. American Business Systems, Inc., 9 Goldsmith St., Littleton, MA 01460, (617) 486-3509.

CIRCLE INQUIRY NO. 259

General ledger program, Maxiledger, has been converted to run on Atari 800. This version is an updated and improved translation, that performs trial balances and produces profit and loss statements and balance sheets. The features are improved updating options allowing the user to quickly and easily review and update any records in the journal or chart of accounts, a running balance column

in the journal listing which shows the user on the input whether or not the journal is balanced, and numerous error traps altering the user of improper inputs. Minimum hardware requirements include: Atari 800 with 24K memory, a single disk drive and optional printer. Price: \$140. Compumax, Inc., Box 1139, Palo Alto, CA 94301, (415) 325-4503.

CIRCLE INQUIRY NO. 260

Mailing list package, Mail 80, includes online record add, change and delete; inquiry by reference number, partial or complete zip code (9-digit codes), and name; label selection and print; and a selective mail-file report. Handles country code and mail-zone codes for US, Canada and Mexico. A floppy disk system is usable for a small to medium size file. A 10 million character (10 MByte) disk is required for 40,000 records. Operating system is CP/M version 1.4 or 2.2 for floppy system, CP/M version 2.2 or MP/M for hard disk system. Language is 8080 object code by Microsoft Basic compiler with some assembly language support programs. A minimum of 48K user memory is needed (a 56K CP/M). Output devices include 24 by 80 video terminal with clear screen and direct cursor positioning and 132 column line printer with top-of-page control. Price: \$295. User guide: \$25. The Systems Shoppe, 104 E. Main, Greenwood, MO 64034, (816) 537-7927.

CIRCLE INQUIRY NO. 261

Multifunction statistics library, NWA Statpak, for users of microcomputers with CP/M and MBasic contains two sections: files utilities and computational programs. The file utilities allow the user to create, edit, and merge data files and select and scale data within files. The computational section contains programs for probability calculations, single variable statistics, regression analysis, continuous and discrete distribution functions, means testing, non-parametric analysis and survey data and contingency tables. Price: \$35. Northwest Analytical, Inc., Box 14430, Portland, OR 97214, (503) 238-9760.

CIRCLE INQUIRY NO. 262

EDUCATIONAL

Vocabulary/reading programs for Apple on disk or cassette and for Pet on cassette include Word Skills 2 and Word Skills 3. The programs cover common prefixes and suffixes, with clever graphics and fun reactions from the computer. The series also includes Word Skills 1. Word Meanings teaches synonyms, homonyms, antonyms, and troublesome words, again with exciting, motivating graphics. These three titles are for kids 10 and up. For high school, especially for remedial work, there is Nouns, covering common and proper nouns. Prices: \$14.95 on cassette, \$19.95 on Apple disk. Program Design, 11 Idar Court, Greenwich, CT 06830, (203) 661-8799.

CIRCLE INQUIRY NO. 263

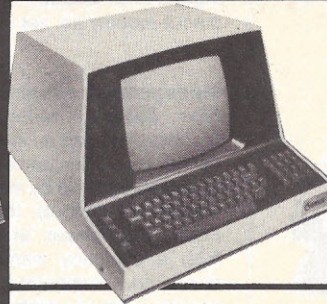
Language teacher is a series of tutorial programs on disk for the TRS-80 I in French, Spanish, German, and Italian featuring a drill learning format with language-to-English or

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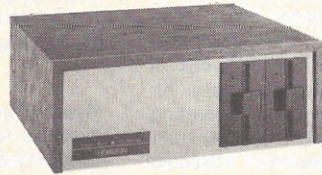
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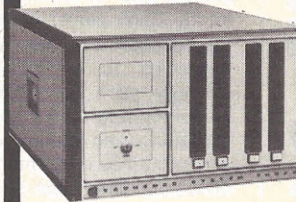
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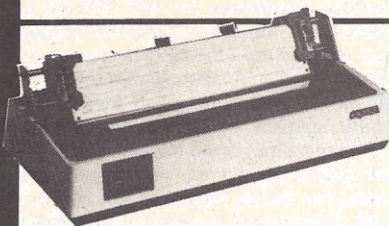
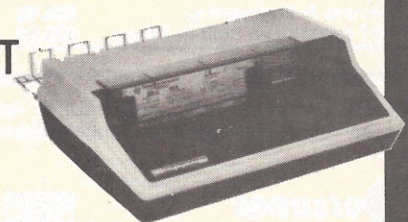
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CIRCLE INQUIRY NO. 98

English-to-language usage options. Each program offers hundreds of word combinations, phrases, and verb conjugation forms to inform and challenge the student. Of special interest to teachers is the feature enabling the user to print out a multiple choice test. Students and teachers can run a full quiz diagnostic routine. Each disk program is priced at \$19.95. Acorn Software Products, 634 N. Carolina Ave. S.E., Washington, D.C. 20003.

CIRCLE INQUIRY NO. 264

Management simulation game in North Star Basic is recommended both as a teaching tool and an intellectual exercise. It's based on similar games played at graduate business schools by teams of managers and realistically models the economic marketplace. Each player, or team of players, controls a company manufacturing three products and competing against other companies, each of which sells three similar products. Each player attempts to outperform his competitors by selecting what he perceives to be an optimum operating strategy such as selling prices, per unit manufacturing costs, production volumes, marketing and design expenditures, plant and securities investments, and stockholder dividends. The most successful firm is the one with the highest stock price. Price: \$17.50/disc, \$12.50/hardcopy listing. GIGA, P.O. Box 1881, Chicago, IL 60690.

CIRCLE INQUIRY NO. 265

Chemistry lab simulation programs for the Apple II provide simulations of high school and college level chemistry lab experiments. Lab #1 uses high-resolution graphics to simulate introductory level experiments, including acidbase titration; a monomolecular film experiment used for the determination of Avogadro's number; and finding an unknown weak acid by determining its equilibrium constant. The program provides randomly generated initial values, giving unlimited test results without repetition. Lab #2 visually illustrates the dynamic behavior of gas particles as the user varies the gas environment. This simulation and the user's manual are designed to guide the student to an understanding of the ideal gas law, the Kinetic-Molecular theory and the principles of entropy. The program features colorful low-resolution graphics and is written in machine language for fast response time. High Technology, Inc., Box 14665, Oklahoma City, OK 73113, (405) 840-9900.

CIRCLE INQUIRY NO. 266

Symbolic math package, Mumath, brings sophisticated math capability to the TRS-80. It provides the facilities to do algebra, trigonometry, calculus, integration, differentiation, exact rational arithmetic and automatic algebraic simplification. The user can control such transformations as expanding powers of polynomials and placing expressions over a common denominator. Other capabilities include trigonometric and logarithmic simplifications and symbolic differentiation and integration. All operations are performed with precision to 611 digits. Musimp, the language in which the program is written, is included in the package, allowing users to

add capabilities and write other types of artificial intelligence programs. The program requires a TRS-80 with 32K RAM and single disk drive. To take advantage of all the capabilities of the package requires a 48K system. Price: \$74.95. Microsoft Computer Products, 10800 N.E. 8th, Suite 507, Bellevue, WA 98004, (206) 454-1315.

CIRCLE INQUIRY NO. 267

Math program, K-8 (kindergarten through eighth grade), is intended to serve as a method of strategy for practice to further develop math skills. The software is supplied on five cassettes and three disks in a binder with a teacher's manual containing complete instructions and sample record keeping forms. It requires a 16K level II TRS-80 (disk driven optional). Price: \$199. Radio Shack, 1300 One Tandy Center, Fort Worth, TX 76102, (817) 390-3272.

CIRCLE INQUIRY NO. 268

Health education programs are now available for Apple II, Commodore Pet/CBM and TRS-80. The Vitafacts series includes packages named Growing Up, Talking About Sex, Drinking and Drugs, Birth Control, Your Blood Pressure and Heart Attacks. The programs have the approval of the Canadian College of Family Physicians. To run a program, the user plays an audio cassette and listens to a combination of dramatic vignettes, group discussion and straight talk which tells the story. Then he participates in a computer exercise to verify his comprehension of the information presented. He is told immediately after responding to each true-or-false and multiple-choice question whether his answer is correct and, if not, what the correct answer should have been. Each package comes with a 12- or 16-page instruction manual containing an introduction to the subject, illustrations and diagrams, a glossary of medical terms and complete, step-by-step loading and operating instructions for each of the three computers. Price: package, \$19.95. Personal Software, Inc., 1330 Bordeaux Dr., Sunnyvale, CA 94086, (408) 745-7841.

CIRCLE INQUIRY NO. 269

ENTERTAINMENT

Graphics programs for 16K TRS-80 II include Cosmic Intruders, a machine language game with sound effects. The player must destroy the alien space creatures which appear in his gun sight. Alien Invasion is a TRS-80 version of Space Invaders. The player must shoot down the aliens who travel back and forth across the screen, while evading the bombs they drop. Price of each: \$9.95. Software Innovations, 320 Melbourne Rd., Great Neck, NY 11021.

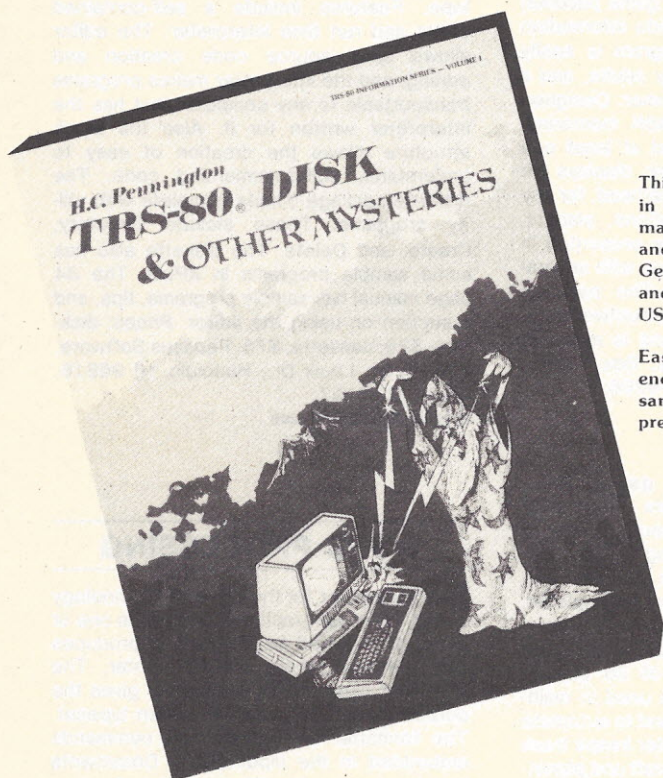
CIRCLE INQUIRY NO. 270

Fast action game, Labyrinth Run, is designed for three levels of skill. The novice level is ideal for practice runs and for children—less frustrating because the run can continue after hitting a wall, with only a time penalty imposed. At the expert level, the runner moves diagonally if two arrow keys are depressed at the same time, and the run

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This valuable textbook, the first in a series by H. C. Pennington, has been reviewed in 3 major magazines and has been the topic of extensive conversation on two major computer communications networks. Presently, the book is being distributed and sold throughout the United States, Canada, the Union of South Africa, England, Germany, Australia, the Netherlands & others. William Barden, Jr., a well known and widely published computer author comments, "... my advice is to get it and USE it!"

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can be faster but corner-cutting is even trickier. A timer starts automatically when the run begins, and record times are retained and displayed for each labyrinth, course and skill level as a challenge for succeeding runs or two-player competition. High-speed graphics (partly machine language) draw each nearly-full-screen labyrinth in two seconds. For TRS-80 level II 16K. Price: \$9.95. Manhattan Software, Box 5200, Grand Central Station, New York, NY 10017, (212) 534-2758.

CIRCLE INQUIRY NO. 271

Tuesday Night Football for Apple II recreates tough NFL action between the player's Houston Oilers (he's the play caller and kicker) and the computer controlled Pittsburgh Steelers. There are 17 plays to pick from on offense, and six defenses. Yardage gains are determined by a complex interplay of luck and carefully developed formulas. Beating the computer requires football savvy and a sure kicking finger. Features include: graphics, sound, strategy, skill, luck, penalties, injuries, fumbles, momentum factor, statistics...even a halftime show. Includes an auxiliary program to drill the player in his kicking game duties, and an 8-page manual explaining everything. Price: \$13.95/cassette or \$17.95/disc. Shoestring Software, 1235 Candlelight, Houston, TX 77018, (713) 688-2105.

CIRCLE INQUIRY NO. 272

Adventure program, Morton's Fork, features a multi-level role playing simulation set in an ancient wizard's fortress. For the TRS-80, CP/M, or Micropolis disk systems. Price: \$35. Chameleon Software, Inc., 4733 N. Mitchner, Indianapolis, IN 46226, (317) 545-5098.

CIRCLE INQUIRY NO. 273

Football strategy game, Pigskin, is for the model I level II TRS-80. Two players can compete against each other, or one player may challenge the program in one of five levels of difficulty. Any game in progress can be saved. There is also a spectator mode for demonstrations. Graphic display of the field shows ball movement and statistics as players employ their strategic skills. Strategy involves the use of 10 offensive plays and six defensive positions. Prices: \$9.95 on cassette, \$15.95 on disk. Acorn Software, 634 N. Carolina Ave., S.E., Washington, DC 20003, (202) 544-4259.

CIRCLE INQUIRY NO. 274

Biorhythm program outputs not only the standard bio-curves but also prints a complete and accurate analysis on a day-to-day basis of the interactions of the physical-emotional-intellectual cycles. Each day is interpreted on its own merit giving plain English commentary on that day's significance. A one to two page report is printed for every month, and any number of consecutive months' analyses may be requested. The program is available on cassette tape or disk for the TRS-80. It will run on a 16K level II machine or a 32K disk system. A 132 column line-printer is also required. Price: \$29.95. Bluebirds, 2267 23rd St., Wyandotte, MI 48192, (313) 285-4455.

CIRCLE INQUIRY NO. 275

Dancing Demon displays an animated figure dancing to music that can be heard by

connecting the computer to an amplifier and speaker. The program, which is supplied on cassette format, includes two pre-programmed selections. The user can also program other tunes of up to 248 notes and choreograph dance routines to go with the music. It is designed for a model I level II TRS-80 with 16K RAM. Price: \$9.95. Radio Shack, 1300 One Tandy Center, Fort Worth, TX 76102, (817) 390-3272.

CIRCLE INQUIRY NO. 276

High resolutions graphics program, Comp-u-sky, responds interactively with the user via text and joystick (or game paddles) to locate, identify, and provide information on stellar objects. The program is easily used by children, enjoyed by adults, and a must for the amateur astronomer. Designed for Apple computers with 48K memories, Applesoft firmware card, and at least one disk drive, it presents graphic displays for eight directions, as well as overhead, for any location on earth. Constellations, planets, the sun, moon, and stars are presented in high resolution graphic displays with several command modes available. The package consists of a diskette and instructive, comprehensive documentation and is available for \$39.95. Scharf Software, Box 18445, Irvine, CA 92713, (714) 557-9206.

CIRCLE INQUIRY NO. 277

Interstellar exploration game, Starcruiser, utilizes two players who must maneuver spacecraft throughout a cluster of 42 solar systems, attempting to discover planets with which to form an alliance. Each player begins the game with one home planet, a fleet of six spacecraft, and over 60 planetary invasion forces. The first player to establish an interstellar alliance of 25 planets wins. A personal computer is used to maintain an information database and to automate various activities. The computer keeps track of the locations of the spacecraft and planetary invasion forces of both players and reveals the presence of enemy forces to each player only when they are discovered by that player's forces. The package includes program cassette tape, Basic source listing in an eight-page booklet, an eight-page rulebook, two 11 x 17-inch (279 x 431 mm) two-color star maps, 308 playing pieces (must be cut out), a game storage bag, and attractive three-color cover sheet. It is available for the TRS-80 16K level II. Price: \$10 (plus \$1 postage and handling). Stratagems Co., Box 786, Taylor, MI 48180.

CIRCLE INQUIRY NO. 278

LANGUAGE

High-level language, Omniforth, modeled after fig-Forth, is now available for the North Star computer. Forth is a flexible tool that gives the user total control of his computer, enabling rapid system design and application development, efficiently combining structured programming, stack organization, virtual memory, compiler, assembler, and file system into an extensible macro-language. Memory requirements are much less than other high-level languages because of Forth's dictionary structure. As applications grow, Forth becomes more efficient than

assembler and will produce programs smaller than assembler. Omniforth contains the interactive Forth compiler, assembler for the 8080 plus Z80, file system, and text editor. It requires 24K memory and North Star DOS. Price: \$49.95. Interactive Computer Systems, 6403 DiMarco Rd., Tampa, FL 33614, (813) 884-5270.

CIRCLE INQUIRY NO. 279

Programming language for Ohio Scientific computers, XPLO, is a block structured, high level, compiler language. The packages come either on 8-inch diskette or cassette tape. Features include a self-contained editor and run time interpreter. The editor allows easy source code creation and editing, and the interpreter makes programs transportable to any computer that has the interpreter written for it. Also the block structure allows the creation of easy to understand, self-documenting code. The diskette package comes complete with utility programs. These include Directory, Create, and Delete. The diskette also has some sample programs in XPLO. The 34 page manual has sample programs, tips, and a section on using the editor. Prices: diskette, \$79; cassette, \$75. Pegasus Software, 1981-A St. Louis Dr., Honolulu, HI 96816, (808) 732-6897.

CIRCLE INQUIRY NO. 280

WORD PROCESSING

Text formatter for the Sanders Technology Media 12/7 typographic printer reads one or more unformatted input files and produces camera-ready output on the printer. The multi-font capability of the printer gives the output appearance of having been typeset. The formatter is controlled by commands embedded in the input file(s). Documents can be produced with headings, footing, itemization blocks and with the text proportionally spaced. Text can be justified left and right, or printed with ragged left margins or ragged right margins. Horizontal tabs can be set and used for columnar information. Features make it suitable for mass mailings or contact preparation. It allows for the input files to be repeated, with substitutable text being entered either from the console or from a parameter file. The formatter, written in "C", runs on any MP/M or CP/M based system with at least 48K of RAM. Price: \$175. Johnson-Laird Inc., 1556 SW 66th, Portland, OR 97225, (503) 292-6330.

CIRCLE INQUIRY NO. 285

Automatic decimal alignment, timesaving execution commands and enhancements to hyphenation and indentation features complement release 2.0 of Wordstar's CP/M compatible software. Decimal Tab permits the user to define decimal locations, tab and enter the number as if using a calculator. The execute command allows users to perform an operating system utility program without abandoning and later recalling Wordstar. Hyphen-Help allows reformatting-cased hyphens to be automatically deleted. Paragraph Indent temporarily sets the left margin to a tab stop so documents with multiple indentations (like outlines) can be easily

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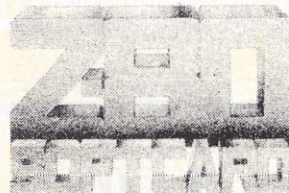
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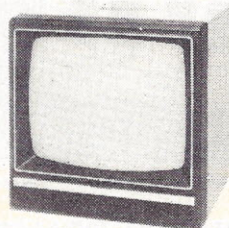


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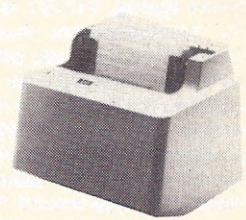
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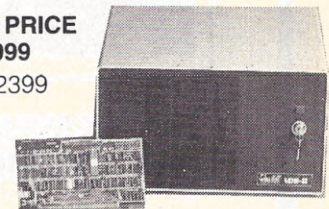
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typed. Price: \$495. MicroPro International Corp., 1299 4th St., San Rafael, CA 94901, (415) 457-8990.

CIRCLE INQUIRY NO. 286

Video typing, VTS/80, is a word processor for microcomputers that operates under CP/M. It is easy to use with custom keytops on the CRT that are color coded by function and have the function on the side of the key. Available for 8080, 8085 and Z80 microprocessors and can interface to almost any operating system. Features include: automatic word wrap around, four major function keys, as well as eight others, push and pull word, global find and substitute and much more. Price: \$549. Microsoftware Pro-

ducers, 3169 Filmore St., San Francisco, CA 94123, (415) 346-7025.

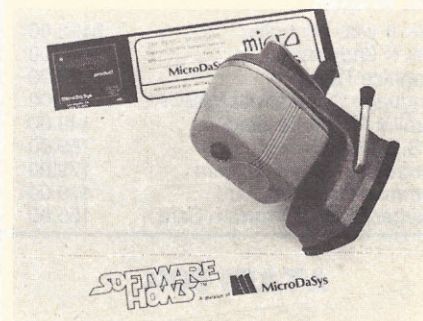
CIRCLE INQUIRY NO. 287

Version of WpDaisy word processor software package is designed for TRS-80 model II. Disk handling capabilities allows the user to change diskettes, list directories of all disks in the system, write files to any disk in the system and review any file on the CRT. The system can also create back-up documents automatically. All or any part of any text can be moved to any disk under a selected file name, either as is or formatted. The complete package includes I/O disk operating system, a basic operating system for 8080, 8085, and Z80 CPUs. InfoSoft Systems, 25

Sylvan Rd. S., Westport, CT 06880, (203) 226-8937.

CIRCLE INQUIRY NO. 288

Pencil Sharpener turns the Electric Pencil II into a complete and intelligent word processing system. Personalized form letters may be sent out by replacing key words in the letter with appropriate items. The set of names, addresses and other information is brought in and the process keeps repeating,



then printing begins. The "data file" may be maintained as a permanent mailing list. Available in most disk formats and works with all versions of Electric Pencil II. Price: \$195. Software Hows, P.O. Box 36275, Los Angeles, CA 90036, (213) 731-0877.

CIRCLE INQUIRY NO. 289

Text processing system, Stylus software, for use on 6809 computers operating under the Flex operating system. The software offers cursor based editing with "on screen" formatting and a full array of editing and formatting commands. The text displayed on the screen may be moved up or down a line or a full screenful at a time. Also, the text can be moved to any page or to specified series of letters or words. The cursor can be moved, left, right, up, down, to any tab position. Any block of text can be moved, copied or deleted. Cost is \$150. Sonex Systems, Box 238, Williamsville, NY 14221, (716) 634-2446.

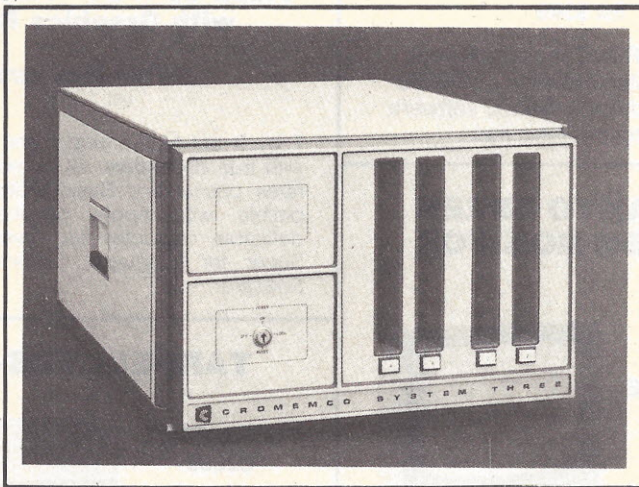
CIRCLE INQUIRY NO. 290

Alternate text processor, Quill Driver, for the model I or model II TRS-80 with at least one disk drive. Features include commands for accessing alternate input files, right justification, handling problem formats such as tabulation and hanging indents, various forms of pagination and more. Thirty three commands in all. A program is included to allow the transposition of Pencil, Basic and Edasm text files to any one of the three file types. Also a driver which allows toggling between upper and lower/shift-upper case, a repeating key and other features. Lower case may be input whether or not user has a lower case mod. Formatted output may be directed to screen, printer or disk. Cost is \$39.95. The Alternate Source, 1806 Ada St., Lansing, MI 48910.

CIRCLE INQUIRY NO. 291

Text formatting program, Textwriter, has several improvements. Proportional spacing and enhanced printing for Diablo, Qume, Sanders and NEC printers have been added. Proportional spacing is accomplished by adjustments to the horizontal motion index on right justified lines. The printing capabilities include: underscore; double strike; super

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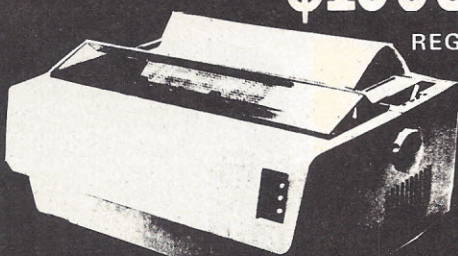
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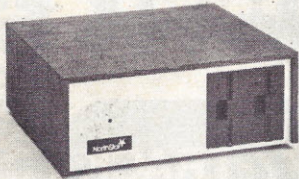


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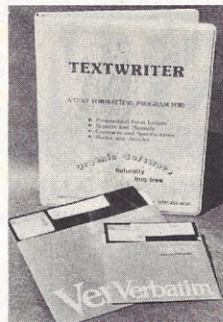
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either by Wordstar compatible control characters inbedded within the text file or by the occurrence of two character alphanumeric control sequence within the text. The program prints personalized form letters, reports and manuals. It personalizes form letters by replacing name and address symbols with values read from either a separate mail list file or from the keyboard. Price: \$125. Organic Software, 1492 Windsor Way, Livermore, CA 94550, (415) 455-4034.

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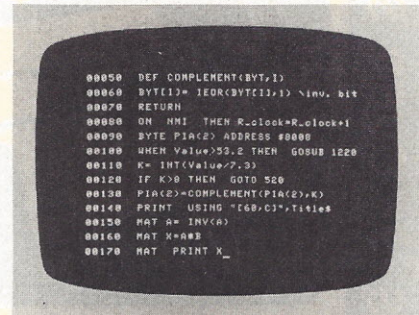
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Basic compiler, a powerful tool for programming, increases program execution an average of 3-10 times. It compiles programs written with the TRS-80 disk Basic interpreter, producing Z-80 machine code that is directly executed by the computer. Extensive optimizations performed during compilation maximize the speed of the resulting object code. Speeds up to 30 times faster than the speed of interpreted programs can be obtained if extensive use of integer operations is made. The compiler has new features to make writing Basic programs easier and more efficient. These include double precision trigonometric functions; full 'print using' for formatted output; extensive disk file capability; 'while/wend' conditionals; variable names up to 40 characters; and a 'call' statement to assembly language or Fortran subroutines. All the features of TRS-80 Disk Basic are supported except direct mode commands which are not usable

in the compiler environment. The compiler will run on a model I TRS-80 with one disk drive and 48K RAM. The package includes two diskettes containing the Basic compiler, Basic runtime library and Link-80 linking loader; complete instruction manual for using Basic compiler; and complete reference manual for Microsoft 5.0 Basic. Price: \$195. Microsoft, 10800 NE 8th, Suite 507, Bellevue, WA 98004, (206) 454-1315.

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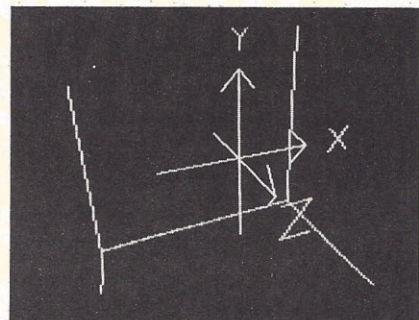
Interactive compiler, Basic-M, provides a new tool for developing solutions using the M6809 microprocessor or monoboard computer. It is a high level programming language providing the power to solve a wide variety of problems with particular emphasis on real-time process control and business-related applications. It will accept most programs and has a number of facilities com-



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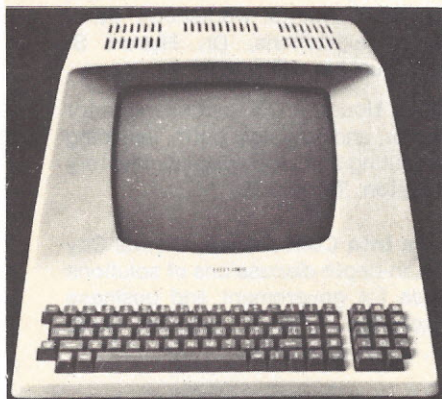


RAM and a Disk II. Documentation is a 32 page manual and includes information on how to interface a Basic program to the editor. United Software of America, 750 3rd Ave., New York, NY 10017, (212) 682-0347.

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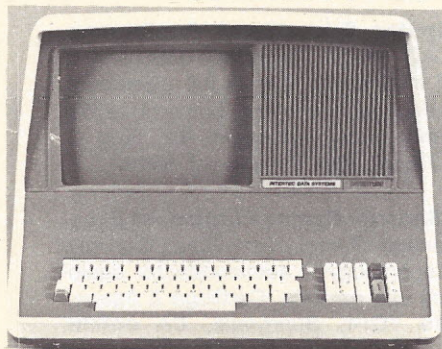
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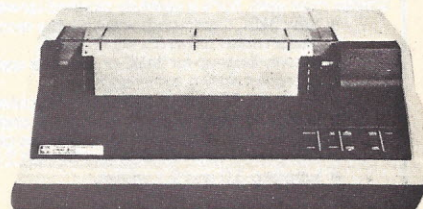
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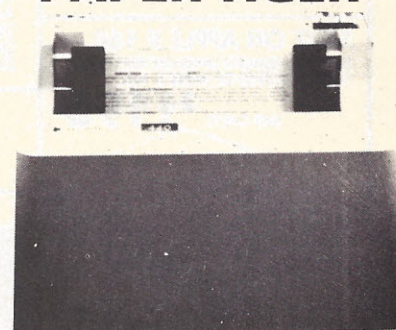


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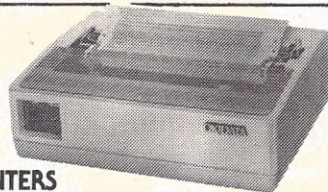
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Nov 28-30 Mystery Kon 5, Houston, TX, a convention for science fiction, fantasy, horror, and nostalgia buffs, including exhibitions on personal computing and video display. Mystery Kon 5, PO Box 36451, Houston, TX 77036.

Dec 1-3 Computer Crime Info Conference, Crystal City Marriott Hotel, Arlington, VA, in-depth discussions of solutions to computer security issues for government and business executives. Information Exchange, 1730 N. Lynn St., Suite 400, Arlington, VA 22209, (703) 521-6209.

Dec 4 California Computer Shows, Hyatt-Palo Alto, Palo Alto, CA, OEM and end-user computer and peripheral products exhibited and demonstrated. Also held Apr 23, 1981 at Hyatt and Mar 12, 1981 at Inn-at-the-Park in Anaheim, CA. Norm De Nardi Enterprises, 95 Main St., Los Altos, CA 94022, (415) 941-8440.

Dec 7-11 Muse N. American Annual Meeting, Bahia Mar Hotel and Yachting Center, Ft. Lauderdale, FL, convention of Modcomp Users Exchange featuring technical session and workshops on Modcomp computers and software. Kathy Black, Modcomp Users Exchange, 4620 W. Commercial Blvd./Suite 6C, Tamarac, FL 33319, (305) 485-8270.

Jan 13-15 Communication Networks Conference and Exposition, Albert Thomas Convention Ctr., Houston, TX, brings together communications professionals, policy makers, carrier, service and hardware vendors interested in combining voice, data and message systems applications. Terri Hamilton, 60 Austin St., Newton, MA 02160, (800) 225-4260.

Jan 16-17 Microcomputer Educational Conference, Arizona State U, Tempe, AZ, forum to introduce educators to the many applications of microcomputers in the classroom, including elementary and secondary schools, fine arts, career and vocational studies and special education. Dr. Gary G. Bitter, Arizona State U., Payne 203, Tempe, AZ 85281.

Jan 27-29 Advanced Semiconductor Equipment Exposition, San Jose Convention Center, San Jose, CA, new products and emerging technology in semiconductor equipment explored in seminars and exhibits. Cartledge & Assoc., 491 Macara Ave., Suite 1014, Sunnyvale, CA 94006, (408) 245-6870.

Feb 24-26 Nepcon West '81, Convention Center, Anaheim, CA, PCB/PWB microelectric materials, hardware, tools, supplies, and test instruments for engineering packaging/production specialists. ISCM, 222 W. Adams St., Chicago, IL 60606, (312) 263-4866.

May 10-13 European Consumer Electronics Show, Nuremburg Fair Centre, Nuremburg, W. Germany, exhibitors from all over the world, including U.S., Japan, Europe and the Far East, offering a complete range of electronic equipment for business and computer use. Tom May, Industrial and Trade Fairs Ltd., Radcliffe House, Blenheim Ct., Solihull, West Midlands B91 2BG, England, (021) 705-6707, Telex: 337073.

BOOK REVIEWS

Basic Primer

by Mitch Waite and Michael Pardee
Howard W. Sams, Indianapolis, IN

Reviewed by Roger H. Edelson

As quoted from the back cover, this book has been written "to teach the basics of Basic." Since it succeeds at this task, —similar to a score of other books—what sets it apart? Nothing more than an easy-to-read style and a removable Basic language reference card. In spite of the author's chuckling declamatory statement, you cannot actually learn Basic from this book without the aid of your own computer. There is no inclusion of exercises or problems and no real feedback system in the text.

The authors do a good job of explaining the language and its applications. In the first chapter, introductory information is presented, along with pertinent bootstrap knowledge needed by a beginner. Discussions of structured programming techniques and comparisons of compiler versus interpreted implementations of Basic should have been included.

In chapter 2, the book hits its stride with coverage of decision/branching statements, subroutines, and simple function statements. Chapter 3 discusses arrays and the 'dim' statement in a lucid presentation. By the time the reader reaches chapter 4, he is ready for the presentation of numeric and string functions.

The chapter on Basic variations covers 'peek', 'poke', 'in', 'out', etc., but information on disk versions and disk commands is almost nonexistent; 'csave' and 'cload' are featured.

Part of the problem stems from the need to prune material to fit into a primer environment. The authors indicate that it was difficult to decide what functions to retain. The appendices help by providing more information without much expository writing. The appendix containing a Basic language reference is very helpful, as are those covering a comparison of Basics and space saving hints.

240 pages \$8.95

Ten Easy Pieces:

Creative Programming for Fun and Profit

by Hans Sagan and Carl Meyer, Jr.

Hayden Book Co., Rochelle Park, NJ

Since the premise of this book is to teach the Basic language through writing and analyzing game programs, there is no effective way to use it without a computer. At first glance, the attempted simulation of a music recital would appear to be a good idea. The goal of maintaining interest by using games as the teaching medium also appears to be good. Unfortunately, the 10 easy pieces and their titles are contrived. The book succeeds in presenting games and fails to teach Basic.

The book covers a wealth of material beginning with introduction to 'print', 'input', and 'go-to' statements through advanced subject material including 'print', 'using', and 'image' statements.

The first two chapters and the preface, presenting material required by beginners, are less obscured by the games approach than the remainder of the book. These sections cover loops, Ascii characters, and 'min-max' operators. As the topics become more complex, we are faced with such chapter titles as: Two Gets You Three, Twisting Slowly, and Slowly In the Wind. A Bang-Bang Approach to Heavenly Bodies covers SQR, ABS, and SGN functions, though if it wasn't spelled out as a subheading, one would never know.

R.H.E.

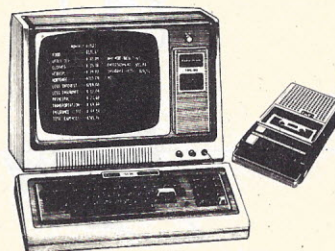
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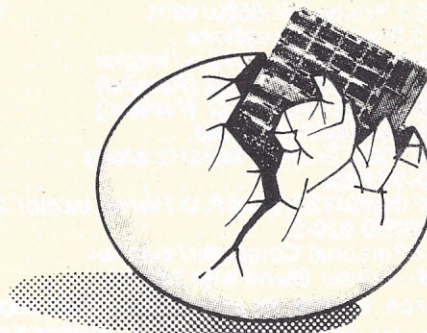
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Heat Loss Audit continued from page 70

		U Factor	
		w/o storm	with storm
Glass			
Single pane		1.13	.38
3/16 inch thermalpane		.69	.32
1/4 inch thermalpane		.68	.31
1/2 inch thermalpane		.58	.29
Doors			
Hollow core		1.87	.44
Solid core		.34	.21
Steel/foam core		.18	.13
Walls			
2 inch fiberglass		.19	
3.5 inch fiberglass		.11	
3.5 inch cellulose		.07	
3.5 inch foam		.06	
5.5 inch foam		.045	
Ceiling			
Fiberglass			
4 inch	.081	.064	.062
6 inch	.056	.044	.041
8 inch	.043	.033	.031
10 inch	.035	.027	.025
Cellulose			
Foam			
Slab			
No insulation and no carpet		.57	
No insulation and carpet		.24	
1 inch foam and carpet		.10	
2 inch foam and carpet		.065	
Floor			
0		.18	
4 inch fiberglass		.06	
6 inch fiberglass		.046	
8 inch fiberglass		.037	
Basement			
Above grade			
Insulation			
0		.41	
R-4		.15	
R-6		.12	
R-8		.09	
Below grade			
Insulation			
0		.057	
R-4		.046	
R-6		.043	
R-8		.039	
Crawlspace			
Above grade			
Insulation			
0		.41	
R-4		.15	
R-6		.12	
R-8		.09	
Below grade			
Same as basement wall			
Ground			
Bare		1.66	
Vinyl		1.06	
2 inch concrete		.74	
1 inch foam		.20	

Figure 2. U factors for various structural components

dows. The same technique can be employed for the other components, as long as the U factor is the same.

Doors: Enter the dimensions just as you did with the windows.

Walls: All exterior wall areas are entered, either in total or as separate sections. The audit will carry a running total and subtract the door and window areas from the overall wall area. Note that the audit is for wood frame structures where the U factor through the frame is different from that of the cavities between the studs. Block and masonry walls may be audited if this slight discrepancy is kept in mind.

Ceiling: Enter the ceiling areas in the same manner as the previous components. Ceilings are commonly the major source of heat loss but they are usually the easiest are to improve.

Slabs: If your home is on a slab foundation, use this segment to estimate the losses to the ground below and around the edge of the foundation. If your home has a basement, treat the floor and the wall area 2 feet below the ground level as a slab.

Basement: Enter only those basement wall areas 2 feet below the ground level and above. These surfaces loose heat nearly as fast as if they faced the elements.

Crawlspace: Enter those crawlspace areas as indicated on the questionnaire.

Infiltration: If your ceiling is 9 feet, enter 9 for room height. If you have a 2-story home with the same floor space on the first and second floor, enter the total room height between the two floors. You may have to run the program a number of times to bring the projected costs in line with your actual costs. You can do this by varying the inflation factor to adjust the projected cost to reflect your total heating expenditures. More about this in analyzing the data.

Electrical: Enter your electrical consumption in kilowatt hours per month (average). Upon entering the number of occupants, the program will list the table of losses and projected costs as shown in figure 3.

Analyzing the audit: If the projected cost figure is not reasonably close to your actual fuel bill, enter a smaller inflation factor if the projection was too high, increase the rate if the projection was too low.

Infiltration losses will generally rank high. Not all infiltration can be eliminated, nor should it be. But a thorough going over with the caulking gun and weatherstripping materials can cut those losses to a minimum.

A thermal improvement payback calculation is tacked onto the end of the audit. Enter the area to be improved and the U factor expected after the improvements are made, along with the estimated cost on a square foot basis, and a payback period will be computed. The program allows for the 15% federal energy tax credit against energy conservation expenditures. The maximum allowable deduction is \$300 (15% of \$2,000). Don't forget to apply for these credits if you make thermal improvements to your home. Check the tax forms to determine what types of improvements qualify.

Money not spent on energy is money earned. Properly installed insulation is your best bet for reducing your fuel bill, and only by auditing your energy losses can you make the best decision regarding thermal improvements. So put your home computer to work as an energy auditor. □

Program follows

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Program Listing

```

10 REM ***** STRUCTURAL HEAT LOSS PROGRAM *****
20 REM BY WILLIAM J. SPITZ
30 REM MARQUETTE, MI 49855
40 REM JANUARY 1980
50 PRINT CHR$(26)
60 INPUT "WHAT IS THE DEGREE DAY VALUE";DD
70 INPUT "WHAT IS THE PRICE OF FUEL";P
80 PRINT "WHAT TYPE OF FUEL IS USED"
90 PRINT TAB(10);"1. ELECTRICITY"
100 PRINT TAB(10);"2. FUEL OIL"
110 PRINT TAB(10);"3. NATURAL GAS"
120 PRINT TAB(10);"4. PROPANE"
130 PRINT TAB(10);"5. WOOD"
140 INPUT "WHICH FUEL";A
150 ON A GOTO 160,170,180,190,200
160 QN$="ELECTRICITY":GOTO 210
170 QN$="FUEL OIL":GOTO 210
180 QN$="NATURAL GAS":GOTO 210
190 QN$="L.P. GAS":GOTO 210
200 QN$="WOOD":GOTO 210
210 ON A GOTO 230,250,270,290,310
220 REM ADJUSTED FUEL COST FACTOR CALCULATION
230 C=1:E=1/3413
240 GOTO 320
250 C=1.42:E=1/144000!
260 GOTO 320
270 C=1.33:E=1/100000!
280 GOTO 320
290 C=1.33:E=1/91500!
300 GOTO 320
310 C=2:E=1/1.7E+07
320 REM COST IN DOLLARS PER BTU
330 F=C*E*P
340 REM CALCULATION OF TOTAL HEAT LOSS
350 PRINT CHR$(26)
360 PRINT TAB(15) "ENTER STRUCTURAL DATA"
370 REM WINDOW LOSS
380 D=0:B=0
390 PRINT ""
400 PRINT "AREA OF WINDOWS"
410 INPUT "HEIGHT OF WINDOW";L
420 INPUT "WIDTH OF WINDOW";W
430 INPUT "U FACTOR OF WINDOW";U
440 B=L*W*U
450 D=D+B
460 P=D/U
470 INPUT "ARE THERE MORE WINDOW AREAS, Y OR N";C$
480 G=D*DD*24

```

```

1000 M=0
1010 IF C$="Y" THEN 1020 ELSE IF C$="N" THEN 1130 ELSE 990
1020 PRINT "AREA OF THE SLAB"
1030 PRINT "CALCULATE FOR ALL WALL AND FLOOR AREAS 2' BELOW GRADE"
1040 INPUT "LENGTH OF THE SLAB";L
1050 INPUT "WIDTH OF THE SLAB";W
1060 INPUT "U FACTOR OF THE SLAB";U
1070 A=(L+W)*4*U
1080 E=A+E
1090 B=L*W*U*.8
1100 D=D+B
1110 INPUT "ARE THERE MORE SLAB AREAS, Y OR N";C$
1120 M=(D+E)*2500*24
1130 PRINT CHR$(26)
1140 IF C$="Y" THEN 1020 ELSE IF C$="N" THEN 1150 ELSE 1110
1150 REM BASEMENT LOSS
1160 D=0:B=0
1170 PRINT CHR$(26)
1180 INPUT "DOES THE BUILDING HAVE A BASEMENT, Y OR N";C$
1190 E=0
1200 IF C$="Y" THEN 1210 ELSE IF C$="N" THEN 1300 ELSE 1180
1210 PRINT "AREA OF THE BASEMENT"
1220 PRINT ""
1230 PRINT "CALCULATE ONLY THE WALL AREA 2' BELOW GRADE"
1240 INPUT "LENGTH OF BASEMENT WALL";L
1250 INPUT "HEIGHT OF BASEMENT WALL";W
1260 INPUT "U FACTOR OF WALL";U
1270 B=L*W*U
1280 D=D+B
1290 INPUT "ARE THERE MORE WALL AREAS, Y OR N ";C$
1300 E=D*DD*24
1310 IF C$="Y" THEN 1170 ELSE IF C$="N" THEN 1320 ELSE 1290
1320 REM CRAWL SPACE
1330 D=0:B=0
1340 PRINT CHR$(26)
1350 INPUT "IS THERE A CRAWL SPACE, Y OR N";C$
1360 P=0
1370 IF C$="Y" THEN 1380 ELSE IF C$="N" THEN 1460 ELSE 1350
1380 INPUT "LENGTH OF CRAWL SPACE";L
1390 INPUT "HEIGHT OF CRAWL SPACE";W
1400 INPUT "U FACTOR OF CRAWL SPACE";U
1410 B=L*W*U
1420 D=D+B
1430 INPUT "ARE THERE MORE CRAWL SPACES, Y OR N";C$
1440 P=D*DD*24
1450 IF C$="Y" THEN 1380 ELSE IF C$="N" THEN 1460 ELSE 1430
1460 REM INFILTRATION LOSS
1470 PRINT CHR$(26)
1480 PRINT "INFILTRATION LOSS"
1490 INPUT "ROOM HEIGHT";L
1500 INPUT "FLOOR AREA";W
1510 D=(L*W*1.1)/60
1520 INPUT "WHAT IS THE INFILTRATION FACTOR";C

```



```

490 PRINT CHR$(26)
500 IF C$="Y" THEN 400 ELSE IF C$="N" THEN 510 ELSE 470
510 REM DOOR LOSS
520 D=0:B=0
530 PRINT CHR$(26)
540 PRINT "AREA OF DOORS"
550 INPUT "HEIGHT OF DOOR";L
560 INPUT "WIDTH OF DOOR";W
570 INPUT "U FACTOR OF DOOR";U
580 B=L*W*U
590 D=D+B
600 E=D/U
610 INPUT "ARE THERE MORE DOORS, Y OR N";C$
620 H=D*DD*24
630 IF C$="Y" THEN 530 ELSE IF C$="N" THEN 640 ELSE 610
640 REM WALL LOSS
650 D=0:B=0
660 PRINT CHR$(26)
670 PRINT "AREA OF WALLS"
680 INPUT "LENGTH OF WALL";L
690 INPUT "HEIGHT OF WALL";W
700 INPUT "U FACTOR OF WALL";U
710 B=L*W*U*.894
720 D=D+B
730 D=D/(.894*U)
740 D=D-(P+E)
750 D=D*(.894*U)
760 INPUT "ARE THERE MORE WALL AREAS, Y OR N";C$
770 I=D*DD*24
780 IF C$="Y" THEN 660 ELSE IF C$="N" THEN 790 ELSE 760
790 X=.106*(D/U)*1.12*.293*DD*24
800 I=I+X
810 REM CEILING LOSS
820 D=0:B=0
830 PRINT CHR$(26)
840 PRINT "AREA OF CEILINGS"
850 INPUT "LENGTH OF CEILINGS";L
860 INPUT "WIDTH OF CEILINGS";W
870 INPUT "U FACTOR OF CEILING";U
880 B=L*W*U*.894
890 D=D+B
900 INPUT "ARE THERE MORE CEILING AREAS, Y OR N";C$
910 J=D*DD*24
920 IF C$="Y" THEN 830 ELSE IF C$="N" THEN 930 ELSE 900
930 X=.106*(D/U)*1.12*.219*DD*24
940 J=J+X
950 REM SLAB LOSS
960 E=0
970 D=0:B=0
980 PRINT CHR$(26)
990 INPUT "IS THE BUILDING ON A SLAB, Y OR N";C$

```

```

1530 R=D*C*DD*24
1540 INPUT "KWH USED PER MONTH";L
1550 T=L*3413*7*.5
1560 INPUT "NUMBER OF OCCUPANTS";W
1570 Z=W*7200*7*.5
1580 A=Z+T
1590 O=G+H+I+J+M+E+P+R-A
1600 PRINT CHR$(26)
1610 PRINT "COMPONENT","HEAT LOSS","COST IN DOLLARS"
1620 PRINT "PART","BTU'S/YEAR","PER YEAR"
1630 PRINT USING "WINDOWS      ##,#####      $$$,###.###";G,G*F
1640 PRINT USING "DOORS        ##,#####      $$$,###.###";H,H*F
1650 PRINT USING "WALLS         ##,#####      $$$,###.###";I,I*F
1660 PRINT USING "CEILINGS      ##,#####      $$$,###.###";J,J*F
1670 PRINT USING "SLAB          ##,#####      $$$,###.###";M,M*F
1680 PRINT USING "BASEMENT       ##,#####      $$$,###.###";E,E*F
1690 PRINT USING "CRAWLSPACE    ##,#####      $$$,###.###";P,P*F
1700 PRINT USING "INFILTRAT.    ##,#####      $$$,###.###";R,R*F
1710 PRINT USING "OCCUPANTS     ##,#####      $$$,###.###";-Z,-Z*F
1720 PRINT USING "ELECT.        ##,#####      $$$,###.###";-T,-T*F
1730 PRINT""
1740 PRINT USING "TOTALS      ####,#####      $$$,###.###";O,O*F
1750 PRINT "DO YOU WANT TO CALCULATE A PAYBACK PERIOD"
1760 INPUT "FOR A THERMAL IMPROVEMENT";C$
1770 IF C$="Y" THEN 1780 ELSE IF C$="N" THEN 2030 ELSE 1750
1780 A=O:K=0
1790 PRINT CHR$(26)
1800 INPUT "AREA TO BE IMPROVED";AN$
1810 INPUT "LENGTH ";L
1820 INPUT "WIDTH ";W
1830 K=L*W
1840 INPUT "ARE THERE MORE AREAS Y OR N ";C$
1850 A=A+K
1860 IF C$="Y" THEN 1800 ELSE IF C$="N" THEN 1870 ELSE 1840
1870 INPUT "WHAT IS THE OLD U FACTOR ";Q
1880 INPUT "WHAT IS THE NEW U FACTOR WITH THE IMPROVEMENT ";V
1890 U=(A*Q)-(A*V)
1900 Z=DD*24*U*F
1910 INPUT "WHAT IS THE COST OF THE IMPROVEMENT PER SQUARE FOOT";N
1920 S=N*A
1930 C=S/Z
1940 TC=A*N
1950 PRINT""
1960 PRINT "THE AREA TO BE IMPROVED IS: ";AN$
1970 PRINT "THE COST OF THE IMPROVEMENT IS: $";TC
1980 PRINT USING "THE SAVINGS IS $$$,###.###";Z
1990 PRINT USING "THE PAYBACK PERIOD IS (IN YEARS) ##.## ";C
2000 INPUT "DO YOU WANT TO CALCULATE ANOTHER PAYBACK PERIOD Y OR N ";C$
2010 IF C$="Y" THEN 1780 ELSE IF C$="N" THEN 2020 ELSE 2000
2020 PRINT" E=mc2=$"
2030 END

```


Getting Started with Pascal

continued from page 58

Listing 1. Program Pocketcalc

```
{ A calculator program for real numbers.
It demonstrates a call to procedure
CALCULATE, within the control of a
WHILE (YESNO not equal to N) DO
statement. No error checking. --DSH }
```

```
PROGRAM POCKETCALC(INPUT,OUTPUT);
VAR A, B, C      : REAL;
OPERATOR, YESNO  : CHAR;
```

```
PROCEDURE CALCULATE;
```

```
BEGIN
  WRITELN ('The operators are: + - * / ');
  WRITELN ('Enter 1st no., then the operator, then 2nd no. ');
  WRITELN ('No spaces or returns necessary between entries ');
  READLN (A, OPERATOR, B);
```

```
{ Pascal will distinguish between
real numbers and the operator
chosen. No need for spaces or a
carriage return until EOL. }
```

```
IF OPERATOR='+' THEN C := A + B;
IF OPERATOR='-' THEN C := A - B;
IF OPERATOR='*' THEN C := A * B;
IF OPERATOR='/' THEN C := A / B;
WRITELN ('The result equals: ', C);
WRITELN ('Do it again? '); READ (YESNO);
{ Multiple statements o.k. on one line }
WRITELN;
```

```
END;
```

```
BEGIN { ***** MAIN PROGRAM }
```

```
  WRITELN ('Do you wish to calculate 2 numbers? ');
  READ (YESNO);
  WRITE(CHR(11)); { ASCII-code for clear screen }
  WHILE YESNO <> 'N' DO
```

```
    BEGIN
      CALCULATE
    END;
```

```
END.
```

Listing 2. Program Conflimit

```
(*G+*)
PROGRAM CONFLIMIT(INPUT,OUTPUT);
```

```
WRITELN(F,'Percent Error      = ',((10000*STDERR)/RESPONS):10:1);
WRITELN(F,'Upper Limit, %     = ',HILIMIT:10:3);
WRITELN(F,'Lower Limit, %     = ',LOLIMIT:10:3);
WRITELN(F);
CLOSE(F);
```

```
{ File must be closed or I/O error
occurs on next procedure call. }
```

```
END;
```

```
BEGIN {***** MAIN PROGRAM }
```

```
  100: WRITE(CHR(11));
```

```
{ 100 is destination for GOTO,
followed by clear screen }
```

```
  WRITELN;
```

```
  WRITELN(OUTPUT,'*****');
```

```
  WRITELN;
```

```
  WRITELN(OUTPUT,'ENTER SAMPLE SIZE');
```

```
  READLN(INPUT,SAMPSIZE);
```

```
  WRITELN(OUTPUT,'ENTER RESPONSE IN %');
```

```
  READLN(INPUT,RESPONS);
```

```
  WRITELN(OUTPUT,'DEGREE OF CONFIDENCE:');
```

```
  WRITELN(OUTPUT,'CHOICES IN % ARE 99, 95, 90, 69');
```

```
  READLN(INPUT,LEVELCON);
```

```
  WRITELN(OUTPUT,'RESULTS TO S>CREEN OR P>RINTER?');
```

```
  READ(INPUT,CHOICE);
```

```
  CALCULATE; { Procedure call }
```

```
  PRINT; { Procedure call }
```

```
  WRITELN;
```

```
  WRITELN('CONTINUE?');
```

```
  READ(INPUT,YESNO);
```

```
  IF (YESNO = 'Y') OR (YESNO = 'y') THEN GOTO 100;
```

```
{ Pascal will treat upper and lower case
differently, so OR is used. Brackets must
enclose elements of logical OR. }
```

```
END.
```

Listing 3. Program Numberfix

```
{ NUMBERFIX by Daniel S. Hunt, 1979 }
```

```
{ NUMBERFIX uses several Pascal features to locate
erroneous characters in what is supposed to be real
number input from the console. Procedure GETNCHK
searches the input characters for anything not between
"0" and "9" or the decimal point, using the LENGTH
function, a UCSD extension of Pascal. It accumulates the
errors in the variable ERRORS, and re-asks the
user for input until a pass through the procedure
results in ERRORS being equal to zero. }
```

```
PROGRAM NUMBERFIX (INPUT, OUTPUT);
```

```
VAR A,REALNUM
```

```
: REAL;
```

```
NUMSTR
```

```
: STRING;
```

```
ERRORS, CORRECT
```

```
: INTEGER;
```



```

LABEL 100;{Line label for GOTO must be declared}
VAR RESPNS, PCTERR, SAMPSIZE,
STDERR, HILIMIT, LOLIMIT, STANDEV : REAL;
LEVELCON : INTEGER;
F : TEXT;
{ Creates text file for printer operation }
YESNO, CHOICE : CHAR;
FILENAME : STRING;

```

```

PROCEDURE CALCULATE;
BEGIN

```

```

    RESPNS := RESPNS/100;
    PCTERR := SQRT((RESPNS * (1-RESPNS))/SAMPSIZE);
    CASE LEVELCON OF
        99: STANDEV := 2.576;
        95 : STANDEV := 1.96;
        90: STANDEV := 1.645;
        69 : STANDEV := 1.0;
    END;
    STDERR := PCTERR * STANDEV;
    HILIMIT := 100 *( RESPNS + STDERR);
    LOLIMIT := 100 *( RESPNS - STDERR);
    RESPNS := RESPNS * 100;

```

```

END;

```

```

PROCEDURE PRINT;

```

```

    BEGIN
        IF CHOICE ='P' THEN FILENAME := 'PRINTER:' {Line A}
            ELSE FILENAME := 'CONSOLE:'; {Line B}
        REWRITE(F, FILENAME); {Line C}

```

{Note: The variable FILENAME declared as String stores either 'CONSOLE:', the UCSD definition of a CRT, or 'PRINTER:'. Either one may thus be opened as a file in the statement of Line C. This method requires an extra declaration as well as an extra line, but may offer additional flexibility should one wish to write results into a disk file. }

```

    WRITE(CHR(11));
    WRITELN; WRITELN;
    WRITELN(F, '*****');
    WRITELN(F, 'Limits of Confidence:');
    WRITELN(F);
    { File variable F must be used in the above
    line spacing statement for execution by
    the printer, else CRT is assumed by Pascal. }

```

```

    IF SAMPSIZE < 32767 THEN
        WRITELN(F, 'Size of Sample = ', TRUNC(SAMPSIZE):10)
    ELSE
        WRITELN(F, 'Size of Sample = ', SAMPSIZE:10:1);
    WRITELN(F, 'Percent Response = ', RESPNS:10:3);
    WRITELN(F);
    WRITELN(F, 'Confid.Level, % = ', LEVELCON:10);
    WRITELN(F, 'Stand.Error = ', 100 * STDERR:10:3);

```

```

PROCEDURE GETNCHK;
VAR I, N : INTEGER;
LETTER : CHAR;
BEGIN
    ERRORS := 0;
    WRITE(OUTPUT, 'NUMBER?');
    READLN(INPUT, NUMSTR);
    N := LENGTH(NUMSTR); {Works only on String, not Char}
    FOR I := 1 TO N DO
        BEGIN
            LETTER := NUMSTR[I];
            IF ((LETTER >='0') AND (LETTER <='9'))
            OR (LETTER = '.') THEN
                ERRORS := ERRORS ELSE
                ERRORS := ERRORS + 1;
        END;
        IF ERRORS > 0 THEN
            WRITELN(OUTPUT, 'ERROR.REDO');
        IF ERRORS = 0 THEN
            CORRECT := 1;
    END;

```

```

PROCEDURE CONVERT;

```

{ Procedure convert is a bit of a fudge as it violates the type structure of Pascal by writing the corrected characters representing numbers to a TEXT file, then resets the file and reads the characters out as real numbers. The algorithm is expeditious but lazy, as the disk unit is actuated in the process even though no file is written. Tsk, tsk. }

```

VAR F : TEXT;

```

```

BEGIN
    REWRITE(F, 'TEMPORARY');
    WRITELN(F, NUMSTR);
    {Above must be writeln else
    adds last digit to number}
    RESET(F);
    READ(F, REALNUM);
    END;

```

```

BEGIN { Main program }
    CORRECT := 0;
    { Flag for repeat sequence below.
    Changes to 1 on error-free
    pass through GETNCHK. }

```

```

REPEAT

```

```

    GETNCHK; { Conditional procedure call.
    Must do at least once. }

```

```

UNTIL CORRECT = 1;
CONVERT; { Procedure call. }
WRITELN(OUTPUT, 'INPUT STRING = ', NUMSTR);
WRITELN(OUTPUT, 'REAL NO. = ', REALNUM);
END.

```


Name-Address

continued from page 82

Listing 1

```

10 REM BINARY TREE NAME/ADDRESS FILE
20 REM AUTHOR GARY A STOTTS
30 DIM N$(100): REM NAME ARRAY
40 DIM A$(100): REM ADDRESS ARRAYS
50 DIM B$(100)
60 DIM LX(100): REM LEFT LINK ARRAY
70 DIM RX(100): REM RIGHT LINK ARRAY
80 DIM P$(100): REM PHONE # ARRAY
90 DIM SX(50): REM STACK ARRAY
100 D$ = CHR$(4)
110 PRINT D$:"OPEN NAMADR, S6, D1"
120 CALL - 936: INPUT "IS THERE AN ADDRESS FILE (Y/N) ";Y$
130 IF Y$ = "N" THEN 200
140 PRINT D$:"READ NAMADR"
150 INPUT E
160 FOR I = 1 TO E
170 INPUT N$(I): INPUT A$(I): INPUT B$(I): INPUT LX(I): INPUT RX(I)
180 NEXT
190 PRINT D$
200 CALL - 936: PRINT TAB(7):"NAME/ADDRESS PROGRAM": PRINT
210 PRINT "1 - ADD A NAME"
220 PRINT "2 - LIST A NAME"
230 PRINT "3 - LIST ALL NAMES"
240 PRINT "4 - CHANGE A NAME"
250 PRINT "5 - END"
260 PRINT : INPUT " ENTER YOUR SELECTION ";A$:M1 = VAL (A$)
270 IF M1 < 1 OR M1 > 5 THEN 260
280 ON M1 GOSUB 320,720,930,1120,1340
290 GOTO 200
300 REM
310 REM ADD A NAME SUBROUTINE
320 CALL - 936: PRINT TAB(7):"ADD NAME RECORD": PRINT
330 E = E + 1: REM FIRST EMPTY POSITION IN LIST
340 I = 1: REM START SEARCH AT ROOT
350 INPUT "ENTER NAME ";N1$
360 IF LEN (N1$) < 1 THEN 350
370 INPUT "ENTER STREET ADDRESS ";A1$
380 IF LEN (A1$) < 1 THEN 370
390 INPUT "ENTER CITY-STATE-ZIP ";B1$
400 IF LEN (B1$) < 1 THEN 390
410 INPUT "ENTER PHONE NUMBER ";P1$
420 REM IF NAME IS LARGER THAN ITH, SEARCH RIGHT BRANCH
430 IF N1$ > N$(I) THEN 600
440 IF N1$ < > N$(I) THEN 480
450 PRINT "DUPLICATE NAME"
460 INPUT "ENTER C TO CONTINUE ";C$
470 RETURN
480 REM IF LEFT LINK NOT NULL, SEARCH LEFT BRANCH
490 IF LX(I) < > 0 THEN I = LX(I): GOTO 430
500 REM HANG NEW LEFT LINK ON PRIOR
510 LX(I) = E
520 N$(E) = N1$: REM FILL NEW RECORD
530 A$(E) = A1$
540 B$(E) = B1$
550 LX(E) = 0
560 RX(E) = 0
570 P$(E) = P1$
580 RETURN
590 REM IF RIGHT LINK NOT NULL, SEARCH RIGHT BRANCH
600 IF RX(I) < > 0 THEN I = RX(I): GOTO 430
610 REM HANG NEW RIGHT LINK ON PRIOR
620 RX(I) = E
630 N$(E) = N1$: REM FILL NEW RECORD
640 A$(E) = A1$
650 B$(E) = B1$
660 LX(E) = 0
670 RX(E) = 0

```

Listing 2

```

10 REM SORT PROGRAM
20 REM THIS PROGRAM WILL SORT A RANDOM ACCESS DISK FILE.
30 REM BOTH MULTIPLE SORT FIELDS AND RECORD INCLUSION/EXCLUSION ARE ALLOWED.
40 REM THE OUTPUT OF THE SORT IS A FILE OF 3 DIGIT RECORD ADDRESS, SPECIFYING
50 REM THE ORDER TO READ THE FILE IN ANOTHER PROGRAM, THUS SAVING DISK SPACE.
60 REM THIS IS A MEMORY SORT, ALTHOUGH CONVERSION TO A DISK SORT IS SIMPLE.
70 REM AUTHOR GARY A STOTTS
80 ONERR GOTO 1350
90 D$ = CHR$(4):H = 9
100 DIM CH$(H)
110 PRINT D$:"OPEN SORT IN, S6, D2"
120 PRINT D$:"DELETE SORT IN, S6, D2"
130 PRINT D$:"OPEN SORT IN, S6, D2"
140 PRINT D$:"READ CURRENT HOURS, L128, S6, D1": REM FILE TO BE SORTED
150 PRINT D$:"READ CURRENT HOURS,R";0
160 INPUT NR: REM # OF RECORDS IN FILE
170 FOR R = 1 TO NR
180 PRINT D$:"READ CURRENT HOURS,R";R
190 FOR C = 1 TO H: INPUT CH$(C): NEXT
200 X = FRE (0)
210 REM INCLUDE ONLY ACTIVE RECORDS.
220 IF CH$(1) < > "A" THEN NT = NT + 1: GOTO 320
230 REM EACH SORT FIELD MUST BE AT MAXIMUM SIZE.
240 IF LEN (CH$(4)) < 3 THEN CH$(4) = "0" + CH$(4): GOTO 240
250 R$ = STR$(R)
260 IF LEN (R$) < 3 THEN R$ = "0" + R$: GOTO 260
270 REM COMBINE THE RECORD NUMBER FOLLOWED BY THE SORT FIELDS.
280 RK$ = R$ + CH$(4) + STR$(VAL (CH$(9))) + CH$(2)
290 REM WRITE THE SORT WORK FILE TO BE SORTED LATER.
300 PRINT D$:"WRITE SORT IN"
310 PRINT RK$
320 NEXT
330 PRINT D$:"CLOSE"
340 REM
350 REM SORT SUBR
360 P1 = 0:P2 = 0:P3 = 0:P4 = 0:P5 = 0
370 PRINT D$:"OPEN SORT IN, S6, D2"
380 PRINT D$:"OPEN SORT OUT, S6, D2"
390 PRINT D$:"DELETE SORT OUT, S6, D2"
400 PRINT D$:"OPEN SORT OUT, S6, D2"
410 NR = R - NT
420 DIM KEY$(NR): DIM WRK$(NR)
430 PRINT D$:"READ SORT IN"
440 FOR C = 1 TO NR: REM FILL ARRAYS
450 INPUT KEY$(C): REM 1ST 3BYTES ARE RRN FOLLOWED BY KEY
460 P5 = P5 + VAL (LEFT$(KEY$(C),3))
470 NEXT
480 PRINT D$:"WRITE SORT OUT"
490 PRINT NR: REM NUMBER OF RECORDS SORTED.
500 PRINT D$
510 X = FRE (0)
520 REM
530 GOSUB 670: REM CALL PASSES
540 REM
550 REM WRITE FILE OF SORTED RECORDS - ADDRESSES ONLY.
560 PRINT D$:"WRITE SORT OUT"
570 FOR C = 1 TO NR: REM WRITE TAG FILE
580 PRINT LEFT$(KEY$(C),3): NEXT
590 PRINT "PROBE 1 SHOULD BE ";INT (LOG (NR) / LOG (2)):" IS ";P1
600 PRINT "PROBE 2 SHOULD BE ";INT ((NR - 1) / 2) * 2 + 1:" IS ";P2
610 PRINT "PROBE 3 SHOULD BE ";NR:" IS ";P3
620 PRINT "PROBE 4 SHOULD BE 0, IS ";P4 - P5
630 PRINT "END OF MERGE/SORT"
640 PRINT D$:"CLOSE"
650 END
660 REM

```



```

680 P$(E) = P1$
690 RETURN
700 REM
710 REM LIST A NAME SUBROUTINE
720 CALL - 936: PRINT TAB( 7);"LIST A NAME/ADDRESS"
730 PRINT : INPUT "ENTER NAME TO LIST ":N1$
740 IF LEN (N1$) < 1 THEN 720
750 I = 1
760 IF N1$ > N$(I) THEN 870
770 IF N1$ < > N$(I) THEN 850
780 PRINT N$(I): REM FOUND
790 PRINT A$(I)
800 PRINT B$(I)
810 PRINT P$(I)
820 PRINT : INPUT "KEY C TO CONTINUE ":C$
830 RETURN
840 REM SEARCH LEFT
850 IF LX(I) < > 0 THEN I = LX(I): GOTO 760
860 REM SEARCH RIGHT
870 IF RX(I) < > 0 THEN I = RX(I): GOTO 760
880 REM
890 PRINT "NAME NOT FOUND"
900 RETURN
910 REM
920 REM LIST ALL NAMES SUBROUTINE
930 P = 1:L1 = 0:T = 0: CALL - 936
940 T = T + 1
950 SX(T) = P: REM PUSH STACK
960 IF P < > 0 THEN P = LX(P): GOTO 940
970 T = T - 1
980 IF T < = 0 THEN INPUT "ENTER C TO CONTINUE ":C$: RETURN : REM ALL NAME FOUND
990 P = SX(T): REM POP STACK
1000 PRINT N$(P): REM PRINT NAME
1010 PRINT A$(P)
1020 PRINT B$(P)
1030 PRINT P$(P)
1040 PRINT
1050 L1 = L1 + 5
1060 IF L1 = 20 THEN L1 = 0: INPUT "ENTER C TO CONTINUE ":C$
1070 T = T - 1
1080 P = RX(P): REM CHECK FOR RIGHT LINK
1090 GOTO 940
1100 REM
1110 REM CHANGE AN ADDRESS
1120 CALL - 936: PRINT TAB( 7);"CHANGE A NAME/ADDRESS": PRINT
1130 INPUT "ENTER NAME TO CHANGE ":N1$
1140 IF LEN (N1$) < 1 THEN 1120
1150 I = 1
1160 IF N1$ > N$(I) THEN 1310
1170 IF N1$ < > N$(I) THEN 1290
1180 PRINT "OLD ":A$(I)
1190 INPUT "NEW ":A$(I)
1200 IF LEN (A$(I)) < 1 THEN 1190
1210 PRINT "OLD ":B$(I)
1220 INPUT "NEW ":B$(I)
1230 IF LEN (B$(I)) < 1 THEN 1220
1240 PRINT "OLD ":P$(I)
1250 INPUT "NEW ":P$(I)
1260 PRINT
1270 RETURN
1280 REM SEARCH LEFT
1290 IF LX(I) < > 0 THEN I = LX(I): GOTO 1160
1300 REM SEARCH RIGHT
1310 IF RX(I) < > 0 THEN I = RX(I): GOTO 1160
1320 REM
1330 REM EOJ
1340 PRINT D$;"DELETE NAMADR"
1350 PRINT D$;"OPEN NAMADR"
1360 PRINT D$;"WRITE NAMADR"
1370 PRINT E
1380 FOR I = 1 TO E
1390 PRINT N$(I): PRINT A$(I): PRINT B$(I): PRINT P$(I): PRINT LX(I): PRINT RX(I)
1400 NEXT
1410 PRINT D$;"CLOSE"
1420 END

```

```

670 REM PASSES
680 REM EXCHANGE PAIRS
690 GOSUB 910
700 REM INIT PASSES-LENGTH-START-SUBSCRIPT
710 S3 = INT ( LOG (NR) / LOG (2))
720 L2 = 1
730 REM REPEAT PASSES S3 TIMES
740 FOR I = 1 TO S3
750 X = FRE (0)
760 L2 = 2 * L2:S1 = 1
770 REM AGAIN
780 S2 = S1 + L2
790 REM
800 GOSUB 1040: REM MERGE SUBLISTS
810 REM
820 REM READY FOR NEXT PASS
830 S1 = S2 + L2
840 IF S1 < = NR THEN 780
850 REM COPY WRK$
860 GOSUB 1260
870 REM
880 P1 = I
890 NEXT I
900 RETURN
910 REM
920 REM EXCHANGE PAIRS
930 REM
940 FOR J = 1 TO NR STEP 2
950 IF J = NR THEN 1000
960 X1 = LEN (KEY$(J)) - 3:X2 = LEN (KEY$(J + 1)) - 3
970 IF RIGHT$ (KEY$(J),X1) < RIGHT$ (KEY$(J + 1),X2) THEN 1000
980 REM SWAP PAIRS
990 T$ = KEY$(J):KEY$(J) = KEY$(J + 1):KEY$(J + 1) = T$
1000 P2 = J
1010 X = FRE (0)
1020 NEXT J
1030 RETURN
1040 REM
1050 REM MERGE SUBLISTS
1060 REM
1070 I1 = S1:I2 = S2:M = S2 + L2 - 1
1080 IF M < = NR THEN 1110
1090 M = NR
1100 REM REPEAT
1110 FOR K = S1 TO M
1120 IF I1 > = S2 THEN 1170
1130 IF I2 > = (M + 1) THEN 1210
1140 X1 = LEN (KEY$(I1)) - 3:X2 = LEN (KEY$(I2)) - 3
1150 IF RIGHT$ (KEY$(I1),X1) < = RIGHT$ (KEY$(I2),X2) THEN 1210
1160 REM SMALL
1170 WRK$(K) = KEY$(I2)
1180 I2 = I2 + 1
1190 GOTO 1230
1200 REM LARGE
1210 WRK$(K) = KEY$(I1)
1220 I1 = I1 + 1
1230 P3 = K
1240 NEXT K
1250 RETURN
1260 REM
1270 REM COPY WRK$ TO KEY$
1280 REM
1290 P4 = 0
1300 FOR K = 1 TO NR
1310 KEY$(K) = WRK$(K)
1320 P4 = P4 + VAL ( LEFT$ (KEY$(K),3))
1330 NEXT K
1340 RETURN
1350 PRINT "ERROR NO "; PEEK (222);" AT LINE "; PEEK (218) + PEEK (219) * 256:
PRINT D$;"CLOSE": END

```


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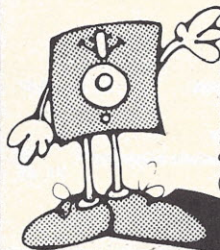
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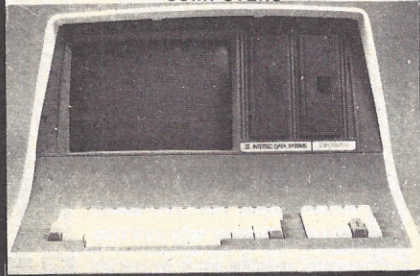
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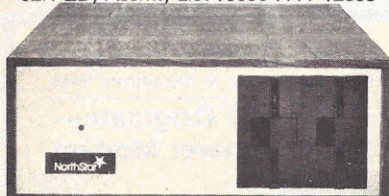
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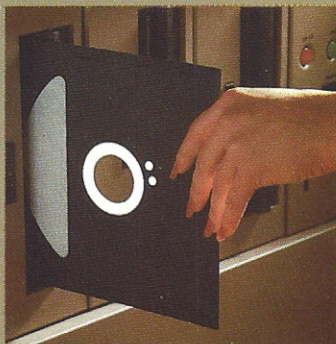
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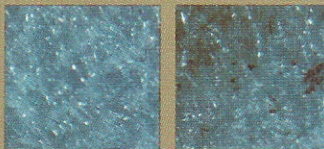
heads are microscopically cleaned without wear, without abrasion.

This 3M head-cleaning diskette kit has been evaluated and approved by major diskette drive manufacturers. It's the best possible way to clean your heads without service calls or machine teardowns.

**At only \$1 per cleaning—
it's the best insurance you
can get.**

This fast-cleaning new Scotch kit comes with everything you need (including special fluid, applicator tip, cleaning diskettes) to handle up to 30 cleanings. That's only about a dollar a cleaning.

With the Scotch head-cleaning diskette kit, you could save yourself a lot more than just a service call. So try this remarkable kit today. For the name of



A Scotch cleaning diskette shown before use, and after 15 cleanings of recording heads.



the dealer nearest you, call toll free: 800-328-1300.

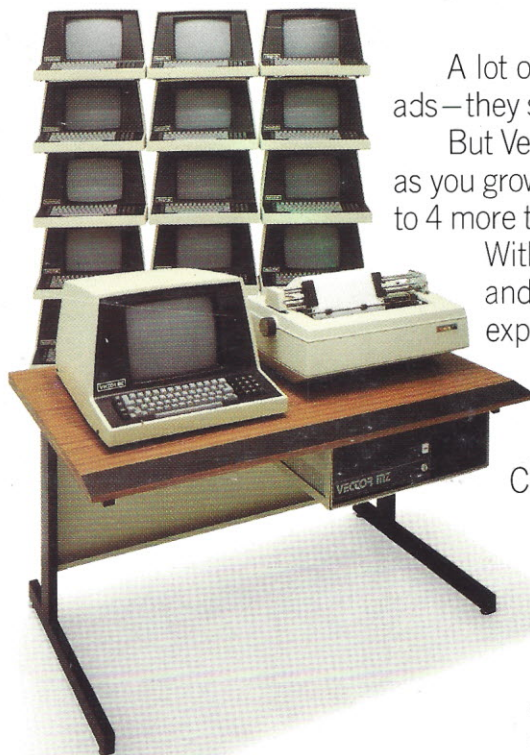
(In Minnesota, call collect: 612-736-9625.) Ask for the Data Recording Products Division.

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